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CONTAMINATION EVALUATION AT THE U.S. COAST GUARD STATION (FORMER ENGINEERS SCHOOL) FORT TOTTEN

FINAL ENGINEERING REPORT

CONTRACT DACW41-86-D-0112 PROJECT NO. CO2NY005700

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Submitted to:

Department of the Army
Kansas City District, Corps of Engineers
700 Federal Building
Kansas City, Missouri

March 28, 1988



TABLE OF CONTENTS

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3	7	•	• •	•	•	• •		• •	•	• •	•		•			14.	• •		an	JN	10	. (6	19	#	ЦИG	ַנם.	IIU	(B)	\mathbf{R}	T INKI 2 4	Da	0.8
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30		• •	•	•	• •	•	• •	•	• •	•	• •	•							• •			Ju	E	155	• A	7	II	suQ)	₽.	, ε	
62	•	• •	•	•	• •	•	• •	•						•	• •					-		_	.	ODE	HT	WE	T	ADI	ΤY	IAN	ΙĀ	p. E
62			•	•		•		•						•				ے.		- 1 2 1 2	ÅΤ	, a	aț/	4	ε.	ε.	ε.	ε				
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87			•			•								DU	ı i	ſα	IME	?\$	I E	ate	Mp	un	OJ:	•	τ.	ε.	E . 1	162 6.6 6.6 6.6				
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hb	3																															

TABLE OF CONTENTS (Continued)

			Pag	<u>e</u>
7.0	CONC	CLU	SIONS AND RECOMMENDATIONS	5
	7.1		Introduction	5
	7.2		Results	5
	7.3		Conclusions5) e
	7.4		Recommendations	0
		ERE	NCES	B
Appen	dix	A	Well Logs and Field Data	
Appen	dix	В	Monitoring Well Completion Diagrams	
Appen	dix	C	Well Survey Data	
Appen	dix	D	RAI Analytical Data	
Appen	dix	E	Quality Control Sample Results	
Appen			New Jersey Soil Cleanup Approaches	

LIST OF TABLES

Tabl	<u>.e</u>		٠.	3	Page
3.1	Finished Well Specifications	• •	• •	• • •	. 17
3.2	Well Development Characteristics	• •	• •	•••	. 18
3.3	Water Levels		• •	•••	. 19
3.4	Well Purging Data		• •	* • •	. 29
3.5	Analytical Summary			•••	. 31
6.1	Aqueous Sample Results	• •	• •	• • •	. 48
6.2	Soil Sample Results	• • •	• •	• • •	.49- 50
6.3	Sediment Sample Results	• •	• •	• • •	. Ś1
6.4	Wipe Sample Results		••	o`	. 52
6.5	Water Criteria	• •	• •		. 53
6.6	Soil Criteria	• • •		• • • •	. 54

LIST OF FIGURES

<u>Figu</u>	<u>Page</u>	1
2.1	Map of General Vicintiy of Fort Totten 5	;
2.2	Base Map of Fort Totten, Coast Guard Property 6	;
3.1	Sampling Locations Map	ļ
3.2	Cross-Section of Wells	j
4.1	E.M. Survey 44	

1.0 EXECUTIVE SUMMARY

A preliminary contamination evaluation has been conducted at the U.S. Coast Guard Station property at Fort Totten, Queens, NY. This evaluation was performed under the Department of Defense (DOD) Defense Environmental Restoration Program (DERP) to confirm or deny the presence of environmental contamination onsite. The methods by which this evaluation was performed are outlined in this report.

Contamination was found to exist on this site. The contaminants detected consist of lead and chromium in groundwater, mercury in soils and marine sediments, petroleum hydrocarbons in marine sediments, and pesticides (DDD, DDT, and DDE) in buildings #619 and #624. Lastly, there does not appear to be any buried ordnance and drums onsite, nor does there appear to be a sealed room in building #619.

DERP CONFIRMATION STUDY AT ENGINEERING SCHOOL, FORT TOTTEN

DERA PROJECT #CO2NY005700

1.1 Summary of Findings

Groundwater, soil, sediment and building surface contamination has been encountered at concentrations which may require regulatory review for this location. The contamination is reasonably suspected to have resulted from activities which took place during the period of DOD control and therefore should be referred to the appropriate office or agency for determination of a future course of action.

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Section 6. Conclusions and recommendations are discussed in Section 7. Well logs and field data are included in Appendix A, monitoring well completion diagrams in Appendix B, well surveying data in Appendix C, chemical analytical data in Appendix D, quality control sample results in Appendix E, and New Jersey soil cleanup approaches are presented in Appendix F.

2.2 Project Objectives

The objectives of this investigation were to provide a preliminary determination of the presence or absence of chemical contamination which may have resulted from former DOD activities at this site and to determine the potential of contamination to local groundwater. To accomplish this objective, the following work was conducted:

- 1. Site visit for collection of background information and establishment of preliminary monitoring well and sampling locations.
- 2. Installation of five groundwater, monitoring wells.
- 3. Collection and analysis of groundwater, soil, sediment samples, and wipe tests.
- 4. Performance of an electro-magnetic survey.
- 5. Coring into bunker #619 to determine its contents.
- 6. Evaluation of physical and analytical data to determine the absence or presence of contamination.

2.3 Site Location and Physiography

The U.S. Coast Guard Station at Fort Totten is located with the U.S. Army Engineers School on the Fort Totten military

installation. Fort Totten is approximately 20 miles east of New York City at the mouth of the East River in Queens, New York (north shore of Long Island) as shown in Figure 2.1. Access to Fort Totten is via the Cross Island Parkway to Bell Boulevard.

Fort Totten is a 147 acre site and has been owned and operated by the DOD since 1857 (at that time called Willets Point). From 1857 to 1944, Fort Totten was used by the U.S. Army for national defense and engineer training purposes. From 1944 to present, Fort Totten has been operated by various U.S. Army commands which includes a training center for U.S. Army reserves and engineers. Today Fort Totten still functions as a training center. However, the land which composes Fort Totten is now owned by several federal agencies along with the DOD.

The U.S. Army still owns and operates the largest tract of land on Fort Totten (92.4 acres). The General Services Administration now owns and operates 45 acres, and the Department of Transportation (DOT) owns 9.6 acres which is operated by the U.S. Coast Guard.

The U.S. Coast Guard operated property at Fort Totten (which is the target of this investigation) occupies the north-west portion of the peninsula and is bounded by U.S. Army property on the north, east and west as shown in Figure 2.2. Access to this property is gained via Willets Street which branches off of Totten Avenue.

This site contains fifteen buildings and a pier. Grassy lawns surround the station buildings in the southern half of the

FIGURE 2.1 MAP OF GENERAL VICINITY OF FORT TOTTEN

SOURCE U.S. COAST GUARD

FIGURE 2.2 BASE MAP OF FORT TOTTEN, COAST GUARD PROPERTY

site and northernmost areas. The northwestern area is heavily overgrown and wooded. Most of the station buildings are grouped along an axis boarding the waterfront on the western boundary. These buildings consist of a station barracks and administration gallery, workshops, storage spaces, and several vacant buildings. A single structure which houses married Coast Guard personnel is situated in the western section of this site and a large frame building (sublet to a civilian organization) is positioned in the center. Lastly, three small out-buildings are located in the north-eastern section of this site. The site elevation ranges from 10 to 60 feet above mean sea level.

2.4 Ownership and Prior Use

Fort Totten has been used for military purposes since the French and Indian War. However, the land on which Fort Totten is built first came into public record in 1640, when it belonged to a farmer named Thomas. From 1829 to 1857, the land passed through the hands of many owners until purchased by the U.S. Government in 1857.

In 1857, Congress appropriated the funds to build a fortification on Willets Point (Fort Totten) and in 1862 construction of the fort was initiated. This fortification was part of what was then known as the "Third System" of seacoast fortifications which began during a period of peace in 1817. The Fort Totten fortification complex was built and designed to protect New York City from naval forces of the confederate states during the Civil War. At that time, the fortification was built

at sea level from massive granite stones which were brought in by barge from quarries in New York and Pennsylvania. Above the stone fort on top of the hill, powder and munition magazines were built. In 1864, construction of this fort was discontinued and the partially completed stone fort can still be seen today on the northern tip of Fort Totten facing Long Island Sound.

During the Civil War, Fort Totten was used as a training post for troops enroute to the front even though its gun batteries never fired in anger.

In 1864, a hospital was built on Fort Totten which treated sick and wounded patients until closed in 1865. During this time, the first permanent garrison for the fort was established. This garrison consisted of 350 men and officers which represented most of the Engineer Corps of the United States Army at the time. In 1868, the War Department established Fort Totten as an Engineering School and in 1869 another general hospital was established on the property. During this period, Fort Totten was the only military engineer depot in the United States and became the arsenal for all mining, sapping tools, school for submarine mining, arsenal for pontoon material, and a depot for all material pertaining to the system of torpedo defenses. Submarine mine defense systems, seacoast searchlights and seacoast mortar batteries were also developed at Fort Totten during this time.

During the Spanish American War, a second set of fortifications was constructed on the hill in back of the first

set of fortifications. The second fortification sat 80 feet above sea level and again was designed to defend against naval attack penetrating into Long Island Sound. At the same time, a skirmish line of torpedoes was laid from Fort Totten across the channel to Fort Schuyler which was located on Throggs Point. These torpedoes were designed to detonate by means of electric batteries located at each end of the line. In addition, two groups of submarine mines (22 per group) were positioned as antiship weapons to assist in the defense of New York City. These improved defenses were once again never used since an attack on New York never occurred.

On July 23, 1898, President McKinley ordered that the fort at Willets Point be named Fort Totten as it is called today. The fort was named in honor of Brigadier General Joseph G. Totten, Corps of Engineers, United States Army who designed and planned many of the improvements of the United States coastal defenses.

In 1903, the Engineering School moved to Washington D.C. and later to Fort Belvoir, Virginia where they remain today. At this time, the Coast Artillery took over Fort Totten.

During World War I, additional guns were added to the fortifications at Fort Totten and troops enroute to the front in Europe were concentrated here.

In 1922, the 62nd Coastal Artillery Regiment was stationed at Fort Totten. The 62nd Coastal Artillery Regiment was equipped with anti-aircraft artillery and later became the mother unit for the entire United States Anti-Aircraft defense system.

Between 1937-1942, many improvements were made at Fort Totten. This included remodeling of buildings, new roads and filling in marshland areas. These improvements made Fort Totten one of the most attractive army establishments in the United States at the time.

During World War II, Fort Totten became the headquarters for the Anti-Aircraft Artillery Command of the Eastern Defense Command. It was then charged with the defense against air attack for the entire east coast and in 1941, the first radar system used on the east coast was installed here.

The Army Anti-Aircraft command was deactivated in 1944 and Fort Totten then became the base for the North Atlantic Wing of the Air Transport Command. Aircraft under this command operated from LaGuardia Air Field. In 1945, Fort Totten became the headquarters for the entire Atlantic Division of the Air Transport Command and functioned under the Army Air Corps. until 1947 when Fort Totten was designated as an Army Medical Center. At that time, the old hospital was reconditioned, refurnished and named the Fort Totten General Hospital until closed in 1949. When the hospital closed, Fort Totten became the headquarters of the New York-New Jersey subarea of the army, and functioned as a training facility for the Organized Reserve Corps. and the National Guard in the New York-New Jersey area.

Since 1967, Fort Totten has been a sub-installation of Fort Hamilton, Brooklyn, New York and is still used today as an engineering training school for the army. However, the land

composing Fort Totten has been sub-divided for use by other U.S. Government agencies. The majority of Fort Totten (92.4 acres) is still owned and used by the U.S. Army. The remaining tracts of land are now in the possession of the U.S. Coast Guard (9.6 acres) and U.S. General Services Administration (45 acres).

The land (9.6 acres) which makes up the U.S. Coast Guard Station at Fort Totten is now being investigated under the Defense Environmental Restoration Program to determine if any environmental contamination exists on this property from past DOD activities.

At present, the U.S. Coast Guard operated property at Fort Totten is used as a small boat station for search and rescue activities, and tending aids to navigation.

3.0 SITE INVESTIGATION

3.1 <u>Introduction</u>

This site investigation was conducted to determine whether contamination exists at the U.S. Coast Guard Station at Fort Totten and whether this contamination appears to be related to past DOD activities at this site. A contamination evaluation, based on environmental samples collected at this site, has been performed in an effort to assess levels of any constituents found on site. The following subsections describe the methods employed to make this determination. Specific items discussed include drilling operations, geology, well construction and development procedures, and the sampling program.

M&E conducted a preliminary site visit prior to beginning any field activities. The preliminary site visit was conducted in order to collect existing information regarding the history of Fort Totten and to determine prospective sampling locations on the Coast Guard property at Fort Totten. The site visit was conducted on October 28, 1986. Well locations and sample locations were selected based on local geohydrology, known areas of past DOD industrial activities, and visual observations.

Monitoring well/groundwater and soil sample locations are illustrated in Figure 3.1.

Surface soil samples were taken near suspected areas of hazardous materials handling operations. Groundwater monitoring wells were positioned near suspected areas of contaminant infiltration and migration to provide samples representative of groundwater beneath the site and groundwater flowing off the site. The wells were also positioned to gain a more accurate understanding of the groundwater flow direction beneath the site.

3.2 Monitoring Well Installation

Five shallow groundwater monitoring wells were installed at the U.S. Coast Guard Station in Fort Totten. All wells were installed and completed as outlined in the approved well Installation Plan of December 1986. The following sections briefly discuss the drilling procedures, geotechnical information, well installation, well development and testing for hydraulic conductivities.

LEGEND

- MONITORING WELL LOCATIONS
- O SOIL SAMPLING LOCATIONS
- WIPE SAMPLING LOCATIONS
- * SEDIMENT SAMPLING LOCATIONS

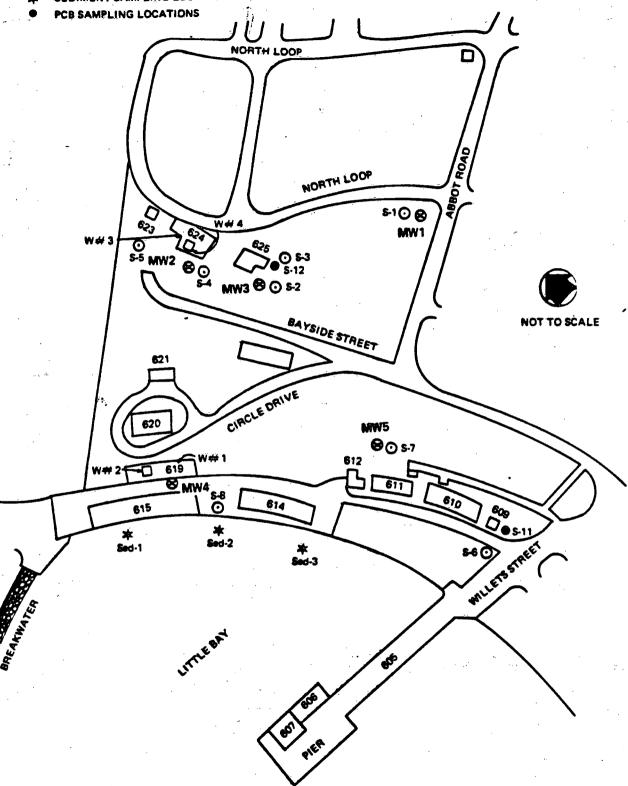


FIGURE 3.1 SAMPLING LOCATIONS MAP

METCALF & EDDY

3.2.1. Boring Operation

Drilling at the Fort Totten site began June 2, 1987. A mobile CME 75 drill rig was used for the drilling program. The method employed 6 1/2 inch hollow stem augers which yielded an approximate hole diameter of 11 inches through the unconsolidated deposits.

The hollow stem auger method involved advancing 5 foot flights of hollow stem augers into the ground. As the augers were rotated into the overburden the wings on the augers carried the drill cuttings to the land surface. As cuttings arrived at the surface they were shoveled into a 55 gallon drum.

Two foot split spoon samples were continuously collected to a depth of 10 feet or to the top of the rock surface, whichever was encountered first.

The drill rig was steam cleaned according to the procedures and protocol outlined in the approved Well Installation Plan.

All tools, flights of augers and accessories used for boring each hole were steam cleaned prior to commencing work on site and in between work on each of the boreholes. Split spoons were cleaned with live steam and a natural bristle brush.

3.2.2. Geologic Data

The unconsolidated deposits encountered during the drilling of the five holes (Figure 3.2) were similar in each of the holes. Generally, a thin surface layer of brown silty sand with

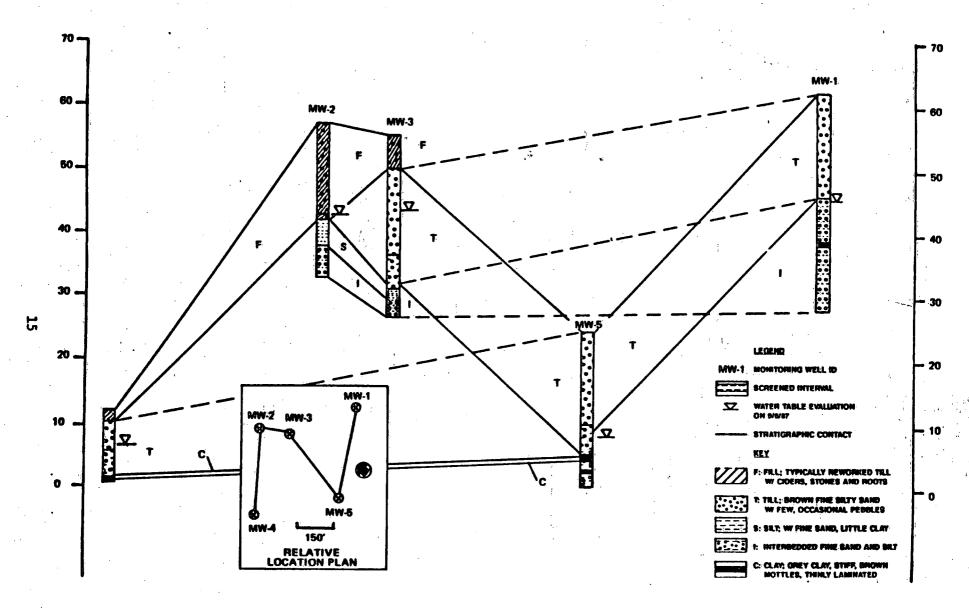


FIGURE 3-2. STRATIGRAPHIC CROSS-SECTIONS, FORT TOTTEN, NY

occasional stones and organic matter overlay deposits of glacial till of Pleistocene age. The layer of unconsolidated deposits ranged from twelve to 33 feet thick. Most split spoons revealed samples composed of brown fine sands and silts with occasional pebbles and less commonly stones. Cinders were also encountered during drilling in samples taken from wells Mw-2, Mw-3, and Mw-4. Laboratory tests performed on soil samples (water content, after boring limits, sieve analysis) in accordance with ASTM methods, confirmed field observations. Soils were chiefly made up of (SM) silty sands, poorly graded sand-silt mixtures and (ML) organic silts and very fine sands with slight plasticity. In accordance with task #6 (Scope of Work paragraph 3.4.1) bedrock, which was not encountered upon refusal, was not cored and therefore not analyzed in this report.

3.2.3. Monitoring Well Construction

Five monitoring wells were constructed on the U.S. Coast Guard property at the Fort Totten site in accordance with the well installation plan. All monitoring wells were constructed with approximately 10 feet of screen set below the water table.

MW1, MW2, MW3, MW4, and MW5 extend to depths of 33 feet, 25 feet, 30 feet, 12 feet, and 25 feet respectively.

Each monitoring well was constructed with 2-inch, threaded flush joint, No. 10 (0.010 inch slot) PVC manufactured well screen; 2-inch PVC (schedule 80), threaded, flush joint, solid riser pipe, No. 1 silica sand, bentonite pellets, grout mixture,

road box cover) and concrete pads with steel protective posts.

Well construction plans for each monitoring well are presented in Appendix B, and well survey data in Appendix C.

Drill holes were reamed and washed out with onsite potable water in cases where obstructions existed at depth. Monitoring wells were constructed by placing PVC screen and riser down the hole. Sand was slowly added to the hole and periodically checked to assure that no bridging occurred and that a proper interval of sand pack filled the annular space between the PVC screen and the borehole well. A minimum 2 foot bentonite seal was placed atop the sand pack and the remainder of the hole was filled with a grout mixture comprised of portland cement and bentonite powder. A 3 foot square concrete pad was constructed on the ground surface and a steal protective surface was emplaced on all wells with the exception of MW4 which was constructed flush with the land surface through the emplacement of a road box. Three guard posts were placed around each steel protective casing.

Table 3.1 summarized the Characteristics of each well.

TABLE 3.1
FINISHED WELL SPECIFICATIONS
U.S. COAST GUARD STATION, FORT TOTTEN, QUEENS, NEW YORK

Well No.	Depth (ft)	Screen Length (ft)	Sand pack (ft)	Bentonite (ft)	Grout Layer (ft)
MW-1	33	10	13	2	18
MW-2	25	10	10	2	10
MW-3	30	10	13	2	15
MW-4	12	10	7	1	2
MW-5	25	10	8	2	11

3.2.4. Well Development

All grout seals in the monitoring wells were allowed to cure a minimum of 48 hours prior to development. Monitoring wells were developed using teflon bailers. After a well was bailed dry, the well was allowed to recharge and bailed dry again. The purpose of the well development is to assure the removal of fine particles from the well, to assure a good hydraulic connection between the well screen, filter pack and formation, and to remove any contamination inadvertently introduced during the drilling process. Well development information is summarized in Table 3.2.

TABLE 3.2

WELL DEVELOPMENT CHARACTERISTICS

U.S. COAST GUARD STATION, FORT TOTTEN, QUEENS, NEW YORK

Development Process	Approximate Volume Of Water Removed (gal)	Development Time (hrs)
Bailer	30	4.0
Bailer		4.5
Bailer		4.0
		4.0
Bailer	100	4.0
	Process Bailer Bailer Bailer Bailer	Process Of Water Removed (gal) Bailer 30 Bailer 45 Bailer 45 Bailer 25

The monitoring wells at the Fort Totten site were developed without incident. The depth and amount of recharge varied within each monitoring well. Therefore a variety of well volumes were required to develop each different well. The technique used to develop the wells removed silts from the screened section of the well and created a secure connection between the well screen, filter pack and fractured formation.

3.2.5. Water Levels

Water level measurements in each monitoring well were recorded after the completion of each well and prior to sampling. This information is presented in Table 3.3. Surveyed horizontal control positions and elevations of each monitoring well are present in Appendix C of this report.

TABLE 3.3

WATER LEVELS

U.S. COAST GUARD STATION, FORT TOTTEN, QUEENS, NEW YORK

Well No.	Land Surface **(NGVD)	*TOC (NGVD)	Water Level Below TOC (ft)	Water Elevation (NGVD)	Hydraulic Conductivity (ft/day)
MW-1	61.50	63.40	17.09	46.31	0.1
MW-2	58.90	61.06	16.99	44.07	0.3
MW-3	57.10	59.13	14.56	44.57	0.4
MW-4	12.15	11.87	5.54	6.28	0.5
MW-5	25.0	27.01	19.04	7.97	0.3

^{*} Top of Casing

Water level elevations vary significantly with each location. Water elevations ranged between 46.31 feet and 6.28 feet above National Geodetic Vertical Datum (NGVD). Inferred groundwater gradients across the site, based on those elevations, indicate that groundwater flow is generally to the northwest downgradient toward Long Island Sound.

^{**} NGVD = National Geodetic Vertical Datum

3.2.6. Hydraulic Conductivities

Slug and bail tests were conducted at all five monitoring well locations in accordance with the approved well installation plan. Slug and bail tests were conducted as follows: The initial water level was recorded. Both tests were initiated by inducing a sudden change in water level and measuring the response of the well. The change in water level was accomplished by introducing a known quantity of previously bailed well water (slugging the well) or removing (bailing the well) a known quantity of water with a bailer. Data were recorded using a water level tape. Data were analyzed using the Hyorslev method when the well screen remained submerged during testing. The modified Hyorslev method was used when data gathered from a well whose screen was not submerged throughout the test.

The hydraulic conductivity (K) values which are based specifically on slug test analysis are presented in Table 3.3. The rate at which the monitoring well responds depends upon the rate of recharge that occurs. This rate can vary by several orders of magnitude depending upon the characteristics of the formation in which each well is installed. Values for K (Table 3.3) range from 0.1 to 0.5 feet per day which is less than one order of magnitude of difference among the five wells. These values fall into the standard range of values given for glacial till deposits.

3.3 <u>Sampling Program</u>

The preliminary contamination evaluation conducted by Metcalf & Eddy included the sampling and analysis of the groundwater monitoring wells, soils, sediments, and wipe tests on the structures. The field sampling episode was conducted from July 18 - July 24, 1987. Sampling protocol and procedures were presented in project work plans submitted to the Army Corps of Engineers in April 1987.

The parameters chosen for analysis were outlined in the scope of work provided by the U.S. Army Corps of Engineers. The analyses selection reflect possible contamination expected resulting from past DOD activities, and includes the measurement of volatile compounds, petroleum hydrocarbons, selected metals, PCB, pesticides, pH, conductivity, and temperature.

3.3.1. Work Plans

After the site visit and prior to actual field work, work plans were developed to outline site investigation procedures. These work plans included:

- . Site Specific Health & Safety Plan
- . Site Specific Well Installation Plan
- Site Specific Sampling Analysis and Quality Assurance Project Plan (S&A/QAPP)

COE approval of these work plans was obtained prior to commencement of well construction, sampling, electro-magnetic survey, and coring into the bunker (Bldg. #619). The field team adhered to procedures described in the above work plans.

The specific work plans were submitted to the COE as separate documents and have not been presented within this report. However, a summary of field techniques employed during the investigation has been included in Section 3.3.3. The analytical methodology is provided in the SA/QAPP and is summarized in Section 3.4. The analytical results of the QC samples have been evaluated and compared against the goals stated in the S&A/QAPP. A quality assurance summary for the project is included in 3.5.

3.3.2. Sampling Locations

The individual sampling locations were selected to assess particular areas of the site. Each location is briefly described to indicate the selection rationale. Sampling locations that are described which could not be sampled during this program are indicated as such. Sampling locations are illustrated in Figure 3.1 and are described as follows:

Monitoring Well MW-1

Monitoring Well MW-1 was installed in the eastern portion of the site at the corner of Abbot Road and North Loop. This well position was selected as an upgradient "background" monitoring point to determine groundwater quality prior to movement through the U.S. Coast Guard Station at Fort Totten. This well position is located on the sites highest elevation with surrounding vegetation consisting of grass and trees. It should also be

noted that a battery of gun mounts "Battery King" was decommissioned and buried below the recreation field just upgradient of MW-1.

Monitoring Well MW-2

Monitoring Well MW-2 was installed downgradient of building #624. This well position was selected to intercept potential groundwater contaminants which may have been released in and around this building. Past DOD activities performed in this area include vehicle repair, and electrical equipment maintenance. In addition, there is some evidence that the area behind building #624 was used as a solid waste "trash" dump.

Monitoring Well MW-3

Monitoring Well MW-3 was installed downgradient of building #625. This well position was selected to intercept potential groundwater contaminants which may have been released in and around this building. Past DOD activities performed in this area include fuel storage in above ground tanks. Dark colored fuel stains were observed on surface soils near this building during the site visit.

Monitoring Well MW-4

Monitoring Well MW-4 was installed downgradient of building #619 "bunker". This well position was selected to intercept potential groundwater contaminants which may have been

released in and around this building. In addition, this well location would also intercept any contaminant migration from building #624 and #625. Past DOD activities in and around building #619 may have resulted in the release of solvents, oils, pesticides, and mercury.

Monitoring Well MW-5

Monitoring Well MW-5 was installed in the vicinity of buildings #610, #611, and #612. This well location was selected to detect potential groundwater contaminants which may have been released in and around these buildings. In addition, this well location would also intercept any contaminant migration from buildings #624 and #625. The past DOD activities that took place at this location were primarily administrative in nature with some light industrial maintenance. However, this area is contiguous to the waterfront area where torpedoes, mines, and search lights were developed and maintained.

Soil Sample S-1

Soil Sample S-1 was collected in the eastern corner of the U.S. Coast Guard Station at Fort Totten near MW-1. This location was selected as an upgradient location to serve as a background sample.

Soil Sample S-2

Soil Sample S-2 was collected near MW-3 down slope from bldg. #625. This location was selected because of dark colored fuel stains (possibly paraffins) on surface soils which were observed during the site visit.

Soil Sample S-3

Soil Sample S-3 was collected at the east corner of building 625 down slope of MW-2 in an area of past oil storage/use activities, and possible spills and leaks.

Soil Sample S-4

Soil Sample S-4 was collected near MW-2 located down slope of building #624. This location was selected due to past maintenance and repair activities which took place in this area.

Soil Sample S-5

Soil Sample S-5 was collected approximately 40 feet behind building #623. This sample location was selected due to suspected solid waste dumping "trash" in this area during past DOD activities.

Soil Sample S-6

Soil Sample S-6 was collected at the corner of Willets

Street and the access road leading shoreside into the U.S. Coast

Guard Station at Fort Totten. This location was selected to

detect potential contaminants down slope from buildings #609, #610, #611, and #612.

Soil Sample S-7

Soil Sample S-7 was collected near MW-5. This location was selected to detect contaminants down slope of buildings #624 and #625, and to detect contaminants in the area of buildings #610, #611, and #612.

Soil Sample S-8

Soil Sample S-8 was collected approximately 30 feet down slope of building #619 "bunker" and in between buildings #615 and #614. This location was selected to detect potential contamination which may have been released from and around these buildings. This is also the area where past DOD industrial activity was the greatest.

Soil Sample S-11

Soil Sample S-11 was collected near building #609. This location was selected for PCB analysis because an electrical transformer station is and has been located there for some years.

Soil Sample S-12

Soil Sample S-12 was collected on the east corner of building #625. This location for a PCB sample was selected because of past oil storage activities and accidental spills or leaks which caused staining on surrounding soils.

Wipe Test W#1

Wipe Test W#1 were taken in the left room facing the bay in building #619. This location was selected because of past DOD storage activities of DDT in this room.

Wipe Test W#2

Wipe Test W#2 was taken in the right room facing the bay in building #619. This location was selected because of past DOD storage activities of DDT in this room.

Wipe Test W#3

Wipe test W#3 was taken in the right room facing the bay in building #624. This location was selected because of potential past DOD storage activities of DDT in this room.

Wipe Test W#4

Wipe test W#4 was taken in the left room facing the bay in building #624. This location was selected because of potential past DOD storage activities of DDT in this room.

Sediment Samples (Sed-1, Sed-2, & Sed-3)

Three sediment samples were collected in the bay along the seawall at the U.S. Coast Guard Station. The three samples were taken at 100 foot intervals between the pier and the back of building #615. The samples were collected at a depth of 6 inches. These locations were selected to detect potential

containment run-off from shore which might have occurred during past DOD activities.

3.3.3. Sampling Methods

Detained sampling and analytical procedures are provided in the S&A/QAPP. Brief summaries of methodology are presented in the following section and include methods for groundwater, soil, and wipe tests.

3.3.3.1. Groundwater Sampling

At least 5 well casing volumes were removed from each monitoring well prior to groundwater sampling. This was necessary to assure that the samples collected were representative of the water quality in the aquifer. Table 3.4 presents well purging data. Sampling of the five monitoring wells involved the following steps:

- . measurement of static water level
- . purging out 5 well casing volumes
- . allow groundwater to recover to static level
- . collection of sample

A teflon bailer was employed for well purging and sample recovery.

TABLE 3.4
WELL PURGING DATA

	SWL (feet)	WELL VOLUME (gallons)	VOLUME PURGED (gallons)	WELL VOLUME PURGED
MW-1	14.70	2.40	12.00	5
MW-2	18.35	1.25	6.25	5
MW-3	16.09	2.45	12.30	5
MW-4	10.85	0.758	3.79	5
MW-5	19.75	0.905	4.60	5

SWL = Standing water level to top of casing

3.3.3.2. Soil Sampling

Soil samples were collected at 10 locations throughout the site. A hand-driven soil auger was employed to collect each soil sample from a depth of approximately 6 inches. Samples were scooped with a stainless steel spoon into a pyrex bowl and homogenized prior to aliquotting into sample containers. Volatile Organic compound samples were collected prior to homogenization to minimize loss of volatile components.

3.3.3.3. Wipe Tests

Wipe tests were collected at four locations by wiping a 2" x 2" hexane rinsed gauze pad over a 9" x 9" area on each floor area tested. The gauze pad was handled with forceps. The wipe test sample "gauze pad" was then returned to its container "VOA Vial" for analysis.

3.4 Analytical Methods

The analytical methods employed to analyze samples are presented in detail in the S&A/QAPP. Table 3.5 summarizes the specific analytical methods used.

3.5 Quality Assurance

As required by the Fort Totten S&A/QAPP a quality assurance summary report was to be prepared upon the conclusion of all sample collection, analysis and data reduction activities. The purpose of such a report is to "summarize and present all pertinent quality control data and discuss the influence of quality assurance issues on the overall data quality." This report consists of the discussion and results provided in this section.

As applied to field measurements and laboratory analyses performed during this project, Quality Assurance is the demonstration and documentation of data quality. These procedures include the recording of all quality control activities undertaken by the field team, and the assessment of analytical performance of the subcontract laboratory through the analysis of internal and external control and audit samples.

3.5.1. Field Sampling and Measurements

All field sampling was in compliance with the S&A/QAPP; all field samples and QC samples were collected as planned; all wells were surveyed before sampling, proper decontamination procedures were utilized, field analytical parameters of conductivity, pH,

TABLE 3.5 ANALYTICAL SUMMARY

	Sample	Sample		EPA
Location	Date	No.	Parameters	Method No.
MW-1	7/22/87	2332-301	Volatile Organics	
	7,22,07	2332-301	Putto stable Organics	8240
			Extractable Organics Total Metals	625
			Total metals	200 Series
MW-2	7/22/87	2332-302,	Volatile Organics	8240
(triplicate)		2332-306,	Extractable Organics	625
	4,3	2332-307*	Total Metals	200 Series
MW-3	7/22/87	2332-303	Voletile Ommeries	
	1/22/01	2332-303	Volatile Organics	8240
			Extractable Organics	625
	•		Total Metals	200 Series
MW-4	7/22/87	2332-304	Volatile Organics	8240
	•		Extractable Organics	625
			Total Metals	200 Series
MW-5	7/23/87	2222-205	**************************************	
1144 - 2	1/23/61	2332-305	Volatile Organics	8240
		44.1	Extractable Organics	625
			Total Metals	200 Series
Well	7/22/87	2332-308,	Volàtile Organics	8240
Sample Blk		2332-309*	Extractable Organics	625
			Total Metals	200 Series
Well		2332-310,	Volatile Organics	0040
Travel Blk		2332-310,	volacine organics	8240
		· (-		• .
Well Travel	7/23/87	2332-360,	Volatile Organics	8240
Blk #2		2332-359*	. • • • • • • • • • • • • • • • • • • •	
S-1	7/20/87	2332-320	Volatile Organics	
	.,,	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Extractable Organics	8240
•		•	Total Metals	8270
			TOTAL WELSTE	7000 Series
S-2	7/20/87	2332-321	Volatile Organics	8240
			Extractable Organics	8270
			Total Metals	7000 Series
S - 3	7/20/87	2332-322,	Volatile Organics	0040
•	, = = , = .	2332-328,		8240
		2332-329*	Extractable Organics	8270
•		6036-367*	Total Metals	7000 Series
S-4	7/20/87	2332-323	Volatile Organics	8240
			Extractable Organics	8270
			Total Metals	7000 Series
		· ·		AND DELIES

TABLE 3.5 (Continued) ANALYTICAL SUMMARY

Location	Sample Date	Sample No.	Parameters	EPA
		1101	1 GIGME CEI B	Method No.
S-5	7/20/87		Volatile Organics	8240
-	· .		Extractable Organics	8270
			Total Metals	7000 Series
S-6 -	7/20/87	2332-325	Volatile Organics	8240
			Extractable Organics	8270
			Total Metals	7000 Series
S-7	7/20/97	2222 226	••••	_ ,
5-7	7/20/87	2332-326	Volatile Organics	8240
			Extractable Organics	8270
	•		Total Metals	7000 Series
S-8	7/20/87	2332-327	Volatile Organics	8240
	To the second		Extractable Organics	8270
			Total Metals	7000 Series
			10041	7000 Series
S-11	7/20/87	2332-330	PCBs	3540 & 80 80
S-12	7/20/87	2332-331,	PCBS	3540 & 80 80
(triplicate)		2332-358,	•	
		*2332-332	·	
Soil Sample	7/20/87	2332-332,	Volatile Organics	8240
Blank	• •	*2332-333	Extractable Organics	8270
•	•		Total Metals	7000 Series
Soil Sample	7/20/87	2332-337	DOR	
Blank #2	1/20/81	2332-337	PCBs	3540 & 80 80
3.43 m			•	
Soil Travel	7/20/87	2332-335,	Volatile Organics	8240
Blank #1	•	*2332-336	e, i.	
Sed-1	7/21/87	2332-341,	Volatile Organics	8240
(triplicate		2332-344,	Total Metals	7000 Series
	•	*2332-345	Petroleum Hydrocarbons	2000 PETTER
			in all odding	Std Methods
Sed-2	7/21/87	2332-342	Volatile Organics	0040
	,, 22, 31	2332 342	Total Metals	8240
				7000 Series
			Petroleum Hydrocarbons	Std Methods
Sed-3	7/21/07	2222 242		
/Cu-J	7/21/87	2332-343	Volatile Organics	8240
			Total Metals	7000 Series
			Petroleum Hydrocarbons	
		. /		Std Methods

TABLE 3.5 (Continued)
ANALYTICAL SUMMARY

Location	Sample Date	Sample No.	Parameters	EPA Method No.
Sediment Sample Blank	7/21/87	2332-346, *2332-347	Volatile Organics Total Metals Petroleum Hydrocarbons	8240 7000 Series 503 A,D Std Methods
Sediment Travel Blank	7/21/87	2332-348, *2332-349	Volatile Organics	8240
Wipe #1	7/21/87	2332-350 2332-354, *2332-355	DDT, DDE, DDD	608
Wipe #2	7/21/87	2332-351	DDT, DDE, DDD	608
Wipe #3	7/21/87	2332-352	DDT, DDE, DDD	608
Wipe #4	7/21/87	2332-353	DDT, DDE, DDD	608
Wipe Sample Blank	7/21/87	2332-356, 2332-357	DDT, DDE, DDD	608

^{*} Note these samples were sent to MRDED-L for QA and have not been included in this report.

and temperature were recorded as required, and chain of custody procedures including sample labeling were adhered to.

3.5.2. Metcalf & Eddy Laboratory Analysis, Systems and Performance Audit

An on-site laboratory systems audit would normally be performed by Metcalf & Eddy to assure that the subcontractor laboratory is capable of maintaining the necessary minimum levels of instrumentation and levels of experience of personnel, and that laboratory quality assurance/control procedures are in conformance with the requirements of the QAPP. However, since the Army Corps of Engineers, Missouri River Division Laboratory (MRD) decided to conduct a performance and system audit of Resource Analysts, Inc. (RAI) to validate their ability to perform work under this contract, Metcalf & Eddy did not schedule any additional audits. The independent performance audit conducted by the COE involved preparation and analysis of QA samples prepared by the Army COE Missouri River Division (MRD) Quality Assurance Laboratory. The purpose of those QA samples was to provide an independent determination of any problem areas in sample handling, analysis, and reporting by the subcontract laboratory. The program also provided data to document performance of the various measurement systems. Quality assurance samples were submitted as blind samples to RAI for comparison of results. The QA samples submitted had been selected by the MRD QA Laboratory to include analyses of duplicate standard pairs, low and high range standards, as well

as blanks. The QA samples were prepared in certified Organic free water, not actual site samples. The results of the MRD audit were not made available to M&E, only that MRD had approved RAI Laboratory to conduct the required analyses under this contract. The laboratory related quality control activities undertaken during the course of this project were designed to assure that measurement systems as well as activities specific to a given site evaluation were under control.

The ongoing laboratory related quality control activities consisted principally of the evaluation of data obtained from the following sample categories: (a) calibration standards, (b) working standards, (c) field samples, (d) laboratory duplicates, (e) laboratory spikes, (f) laboratory methods blanks, (g) trip blanks, (h) laboratory split samples. Procedures to be used to evaluate that data would include calculation of arithmetic means, standard deviations, relative percent differences for duplicate samples and comparison of differences between standards of spiked and experimentally determined values expressed as percent recovery. Identification and treatment of outliers was not appropriate as no marked deviations were noted in the data set. The information used to evaluate the laboratory quality control activities was to be obtained from the subcontract laboratory performing the analytical work. An assessment of the laboratory's compliance with stated objectives presented in the Fort Totten S&A/QAPP is summarized below.

Quality Assurance data are presented in tables F.1 through F.5 in Appendix E. The tables include results for field

duplicate analysis, laboratory sample spikes, laboratory replicates, laboratory sample spikes, surrogate Recoveries and laboratory control data.

All Field Duplicate Analysis with the exceptions of Chromium and Lead in MW-2, Silver and Cadmium in S-3, and Silver and Barium in Sed-3 were within QA objectives as presented in Table F.1. Laboratory Sample Spikes were within QA objectives with the exception of Selenium in MW-1, S-1, and S-7, Arsenic in S-7, and petroleum hydrocarbons in Sed-1 field duplicate, as presented in Table F.2. Laboratory replicates, as presented in Table F.3, were within QA objectives with the exception of Barium in MW-1. The Surrogate Standard Recoveries for volatile compounds as presented in Table F.4 were within the control range with the exception of D(4)-1-2-Dichloroethane in S-3, D8-Toluene in MW-2, MW-2 Field Duplicate, MW-3, MW-4, MW-5 Lab Replicate 2, Well Travel Blank, and Lab Controls D0027, and D0012. Surrogate Standard Recoveries for Extractable organics were within control ranges with the exception of 2-F1-Phenol in S-3 Field Duplicate, S-5, Blank A014, S-8, and S-8 Lab Duplicate, Nitrobenzene and 2-F1-Biphenyl in S-1, S-2, S-3, S-3 Field Duplicate, S-7, Blank A014, S-8, and S-8 Lab Duplicate, and Terphenyl-d14 in S-8 as described in Table F.5.

3.5.3 RAI Quality Assurance

<u>Wells</u>

Spike recovery was below control limits for selenium. Since both the calibration and verification and the laboratory control sample were well within control limits, this probably represents a matrix effect.

Silver recovery was low in the laboratory control sample, however, since spike recovery was well within control, the data was accepted for the series.

Silver, barium, cadmium and chromium for all samples and lead for "Well #4 2332-304", (our laboratory number 10465-12) were analyzed by method 7241 (Graphite Furnace Atomic Absorption Spectroscopy).

Surrogate recoveries for d₈-toluene were consistently low for these samples. Some fell just below acceptance levels. This would not have effected the detection of toluene however. No toluene was found in the samples. Methylene chloride was found in an instruments blank at 11 ug/L. It was not found in the samples. One of the laboratory replicates had higher than normal recovery for methylene chloride. This elevated level is likely due to lab contamination. Matrix spike recoveries were acceptable.

BIS-2-ethylhexyl phthalate was found in the blank for semivolatiles at a level equivalent to 100 ug/L. Some samples contained this compound at similar levels. These values should be considered suspect. Matrix spike recoveries for the

semivolatiles ranged from 38 to 134% recovery. While some values were outside project limits, they fell within EPA CLP acceptance criteria.

Soils

Spike recoveries were below control limits for arsenic in the soils samples and selenium in both the soil and water samples. Since both the calibration verification and the laboratory control sample were well within control limits, this probably represents a matrix effect.

Silver recovery was low in the laboratory control sample, however, since spike recoveries were well within control for both the soil samples and the water sample, the data was accepted for the series.

Silver, Barium, Cadmium, Chromium, and Lead were analyzed by Method 6010 (Inductively Coupled Argon Plasma Spectroscopy) ICP.

No problems were encountered for Volatile Organics.

No problems were encountered for Acid/Base Neutral Extractable Organic Compounds. No analytical problems were encountered for PCB's.

Sediments

Spike Recoveries were below contract limits for arsenic in the soil samples for the selenium in both the soil and water samples. Since both the calibration verification and the laboratory control sample were well within control limits, this probably represents a matrix effect.

Silver recovery was low in the laboratory control sample, however, since spike recoveries were well within control for both the soil samples and the water sample, the data was accepted for the series.

Silver, barium, cadmium, chromium, and lead were analyzed by method 6010 (Inductively Coupled Argon Plasma Spectoscopy). Lead was analyzed in the water sample "2332-346 FT Sed Sam Blk", (our laboratory number 10,430-13) by method 7421 (Graphite Furnace Atomic Absorption Spectroscopy).

Recoveries were low for the volatiles laboratory control sample. Methylene chloride was found in the water blank at 13 ppb but was not found in the samples. Toluene was found at 0.7 ug/g in the soil blank but was not found in the samples. The duplicate water matrix spikes showed higher than expected recoveries (113 to 171%). The detection of volatiles was not effected however, and no compounds were detected in the samples. Surrogate recoveries for all samples were acceptable except for BFB in 2332-346 FT Sed Blk which was 83% with an acceptance limit of 86%.

Matrix spike recovery for oil and grease was 156% and 60% for the two soils spiked. Inhomogeneity of the soils contributed to the error.

Wipes

Wipes were analyzed for pesticides by electron capture gas chromotograph and confirmed using Hall Detector. Interferences in the wipes may have been present and raised detected quantities. These samples could not be subsampled for precision and occurance determination. Laboratory Control Sample results for pesticides were within CLP acceptance limits except for Endrin and DDT which showed 51 and 27% recovery. CLP criteria are 56 and 36% respectively. The calibration for DDT is updated with each calibration check sample to compensate for changing DDT breakdown characteristics. This is reflected in the reported concentration for DDT in the mid-range calibration QC data.

3.5.4 Summary

The above observations are minor in nature, thus the analytical sample data presented within this report is satisfactory and completely usable for the original purpose of this site characterization.

4.0 ELECTRO-MAGNETIC SURVEY

4.1 <u>Introduction</u>

An electro-magnetic (EM) survey was performed at the U.S. Coast Guard Station at Fort Totten on December 8-10, 1986. The purpose of this survey was to detect potential buried ordnance and drums, and to verify that groundwater monitoring wells could be installed safely without drilling into buried obstructions such as water lines, power lines, and communications lines.

The instrument employed in this survey was a GEONICS EM-31. This instrument is direct "continuous" reading in millisiemens per meter (ms/m). It has an effective exploration depth of about 6 meters and is composed of a self-contained

dipole transmitter and dipole receiver which operates on a 9.8 kHz frequency. The EM-31 is powered by alkaline "C" cell batteries and has conductivity ranges from 3 to 1,000 ms/m.

4.2 Subsurface Conditions

Prior to performing the EM survey, research at the Post Engineers Office at Fort Totten was conducted. This research consisted of obtaining all known drawings of underground utilities which included communications lines, potable water lines, fire fighting water lines, electrical service lines, storm drainage lines, and sewer lines. During this research, some utility drawings were obtained. However, it was learned that many drawings of underground utilities at Fort Totten were destroyed during a fire. It was also learned that the U.S. Coast Guard Station property at Fort Totten is a maze of abandoned underground cables which served the old gun emplacements and overall communications for the site. During the EM survey, some of these cables could be seen in various states of decay penetrating above the ground surface. Drawings of these abandoned cable positions were not available.

4.3 Method

The U.S. Coast Guard property at Fort Totten was mapped as a grid system prior to performing the EM survey. The grid consisted of 12' x 12' squares which were measured off in horizontal and vertical lines with cloth tapes. The horizontal and vertical lines were then walked while carrying the EM-31

which was set on 500 mv at a maximum detection range of 30 mmho/m. All readings at or above 30 mmho/m during the survey were marked with a wooden stake. Consistent readings in straight lines were verified with utility location drawings or assumed to be abandoned undocumented utility lines. Single non-consistent EM hits were marked and later re-surveyed in an attempt to establish a pattern.

4.4 Results

As expected, the EM-31 detected all known utilities as well as undocumented abandoned utilities. Many abandoned utility lines detected were discussed with personnel of the U.S. Coast Guard Station. Their local knowledge of this area verified the existence of these abandoned lines. U.S. Coast Guard personnel recalled unearthing many of these lines during station improvements and maintenance.

The only major EM hit which could not be explained was in the northeast area of the recreation field as shown in Figure 4.1. This area covers a buried fortification "Battery King" which might account for the unexplained EM hits. It was later learned that Battery King still contains the metal ring gun mounts, although the guns themselves were removed during the battery's demobilization. It was also learned that a minirallway system existed between Battery King and the underground bunker munitions storage facility on Fort Totten's northern tip. The railway was used to transport munitions to Battery King and may still exist in whole or in part. Metal pieces of this

railway would include axles, wheels, tracks, spikes, and rail car bodies.

4.5 Conclusion

The subsurface area below the U.S. Coast Guard Station at Fort Totten is a maze of utility lines and debris. This was ascertained from old and new site drawings, interviews with Coast Guard and Army personnel, visual observations, and EM survey results. Historically, ordnance has been unearthed along the waterfront of the U.S. Coast Guard Station and on U.S. Army property to the north. This was ascertained by interviews with U.S. Coast Guard and U.S. Army personnel. However, no buried ordnance or drums were found on the U.S. Coast Guard Station property by M&E or the present U.S. Coast Guard personnel at the station. In addition, the majority of the EM survey data resulted in continuous and consistent detections which are interpreted to as buried utilities. The exception to this is the northeast area of the recreation field as shown in Figure 4.1. This area contains magnetic anomolies which could be the remnants of a buried rail road system that serviced Battery King. It can not be concluded with certainty that buried ordnance or drums do not exist on this property without performing excavations. However, it is unlikely that buried ordnance and drums exist on the U.S. Coast Guard property. This is based on interviews with U.S. Coast Guard personnel presently assigned to Fort Totten, results from the existing EM survey data, drawings and past DOD activities that took place on this property.

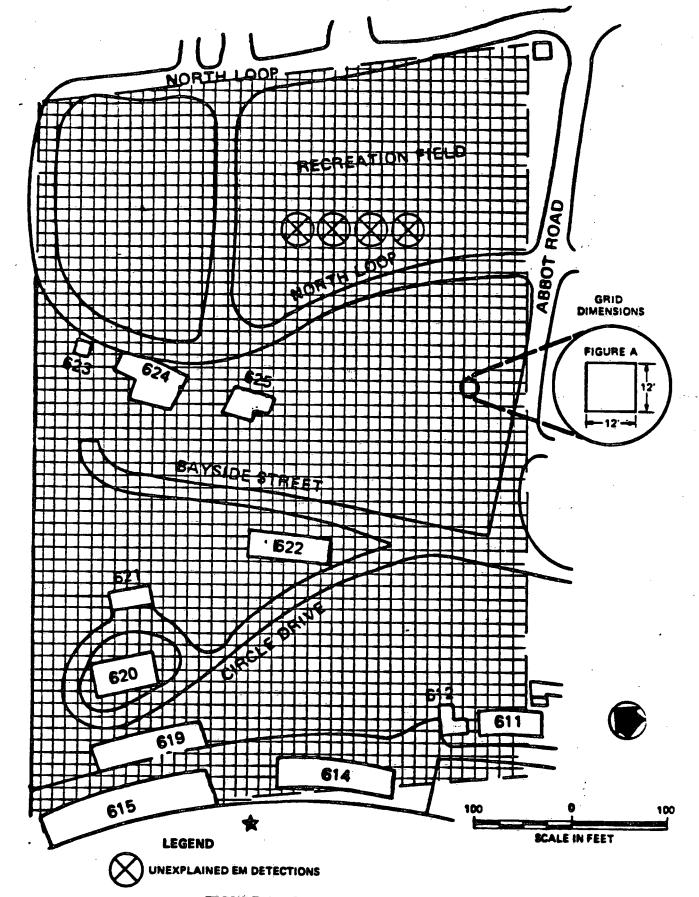


FIGURE 4.1 EM SURVEY GRID SPACING

5.0 BUNKER (BUILDING #619) PENETRATION

5.1 Introduction

The bunker (building #619) which stands at the east corner of the U.S. Coast Guard property at Fort Totten across from building #615 was thought to have a sealed room. This assumption was made due to the fact that approximately three-fourths of the structure has usable space and the remaining one-fourth (east corner) appears to be sealed with concrete aggregate. Concrete aggregate was also used to construct the entire bunker.

The bunker was constructed in the early 1900's. It was used first as a communications center and later as a storage area.

DDT was once stored in this structure, but now it is used by the U.S. Coast Guard Station as a general equipment storage area.

5.2 Method

A 6-inch diameter diamond tip barrel coring devise powered by a 6 hp electric motor was used to core through the front outside wall and interior wall of the suspected room. During the coring, operators used supplied air breathing systems and continuously monitored the ambient air for Organic vapors, radiation, and explosive levels. Air monitoring was performed and supplied air was breathed in the event wall penetration resulted in a contaminant release.

The length of the coring barrel was 36 inches at full penetration. A 36-inch barrel was selected since the average thickness of the bunker wall in usable spaces was 18 inches.

5.3 Results

The coring barrel penetrated the front outside bunker wall to a depth of 36 inches without reaching an interior space. Coring was again performed on the inside bunker wall which was accessed through the interior space. During the coring of the interior wall, a 2-inch void was encountered at 16 inches of penetration. The coring barrel passed through the 2-inch void and continued coring into the next wall until a depth of 36 inches was achieved. At this depth no interior space was found to exist in the suspected room.

5.4 Conclusion

The east end of the bunker (building #619) does not appear to be a sealed room. This area of the bunker appears to be solid reinforced aggregate concrete. The matrix of the aggregate in the suspected room is identical to that of the usable rooms and walls. This probably means that all parts of the bunker were constructed at the same time and that a room was not later sealed In addition, construction of the bunker appears to be prefabricated. Walls were probably pre-formed in pieces and later assembled by a crane. This would account for the 2-inch void between the bunker interior wall and the suspected room. Lastly, the east corner faces Long Island Sound which would be where a potential attack would come from. It is, therefore, suspected that the east wall of the bunker was given extra strength as was the roof. Both the roof and the east bunker wall "suspected room" are constructed to a 7-foot thickness of reinforced concrete aggregate.

46

6.0 PRESENTATION OF RESULTS

This section contains a summary of sample analysis results and a presentation of groundwater standards and soil clean up criteria associated with the analytes measured. The analytical results are discussed and compared to the standards and criteria in Section 7 to determine the presence or absence of contamination at the site.

6.1 Analytical Results

Table 6.1 summarizes the monitoring well and other aqueous sample data. Soil sample data are presented in Table 6.2, sediment sample data are presented in Table 6.3 and Wipe sample data is presented in Table 6.4. Only analyte concentrations greater than detection limits were reported in Tables 6.1-6.4. The complete analytical results are presented in Appendix D.

6.2 <u>Water and Soil Standards and Criteria</u>

To present a basis for comparison of analyte concentrations measured to those acceptable or suggested for groundwater and soils, National Priority Drinking Water Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) developed under the Safe Drinking Water Act, NY State groundwater standards, US soil background metal levels, NJ soil cleanup objectives and NJ surrogate or action levels of organics in soils have been presented in Tables 6.5 and 6.6.

The NJ objectives are presented to place the concentrations of metals and volatile organics detected in soil at the site into perspective, because no New York State Standards or criteria were

	·	•	MV-1 2332-301	MV-2 2332-302	MV-3 2332-303	MV-4 2332-304	MV-5 2332-305	Samp Bik 2332-308	Trav Blk #1 2332-310	Trav Blk #2 2332-360
Volatile Organ	ice		ND	MD	MD	WD				£335-300
Semi-Volatile	Drganics			*			AID .	MD	WD	₩D
Bis(2 ethythex	ylphthalate)	ug/L	120	120	170	120	120	110	RA .	HA
Total Metals			*							•
Arsenic Barium Chromium Lead	es As es Be es Cr es Pb	ug/L ug/L ug/L ug/L	<10 200 31 7	16 230 97 30	<10 <100 32 7	<10 150 72 330	<10 <100 <25 <5	<10 <100 <10 <5	na Ma Ma Na	NA NA NA NA
FIELD MEASUREME	NTS	.*		÷			· ·:			•
pil conductivity temperature	þil unfts unhos C		6.6 430 14	6.4 210 14	7.5 470 13	6.5 790 17	5.6 210 14	9999 0999	900) 900 900	1071 1071 1074

NA - Not analyzed for this parameter

* units ug/kg

Note: only enelyte concentrations greater than detection limits have been reported

III - Not messured

Samp Bik - Sample Blank

Trav Bik - Travel Blank

ND = Not detected

TABLE 6.2. SOIL SAMPLES

												•		
		8-1 2332-320	5325-351 8-5	\$332-322 \$3	8-4 2332-323	8-5 2332-324	8-6 2332-325	8-7 2332-326	1-8 2332-327	Seep 81k 2332-333	Trav 81k 2332-335	MEON Blank C-3839	Leb Bik B-A104	Leb Bik
		ma/ga	ug/kg*	/ ug/kg*	ug/kg*	ug/kg*	ug/kg*	sig/kg*	ug/kg*	ug/L	ue/L	un/ka*	ug/kg*	C-3816 up/kg*
Volatile Organica	•		;							•				- AND AND
Methylene chieric	b	500	-580	<500	<300	<500	·<500							
Tolumo		<500	<500	<500	<500	<500	<500	<500 <500	<500 <500	31 5	12	1,400 1,000	, MA	3 1.6
Seel Votatile Gra	unice										: 3	.,	_	1.0
Flureanthone	•	<300	2,000	TRACE	<300	TRACE	700	<300	***					
Pyrone		<300	1,700	TRACE	<300	<300	400	<300	600 TRACE	<10	i BA	.100	<300	· 60A
Penzo(a)anthracen	•	<300	1,300	<300	<300	<300	TRACE	<300	<300	<10	· MA	M	<300	MA
Chinada		<300	1,000	<300	<300	<300	TRACE	<300	<300	<10 <10	, MA	MA.	<300	MA.
Bis(Zothylhazyl)p		700	700	1,500	1,400	1,700	1,300	1,500	1,000	<10 53	MA.	. MA	<300	
Denzo(b)fluorenth	ene	<300	2,100	<300	<300	TRACE	700	<300	<300		MA:	MA	700	•
Bonzo(a)pyrane		<300	1,400	<300	<300	<300	700	<300	<300	<10	MA	MA	<300	CAA.
Idano(1,2,3-c,d)p		<300	600	<300	<300	<300	<300	₹300	<300	<10	***	MA.	<300	MA.
Berac(g,h, I)peryl		<300	700	<300	<300	<300	<300	<300	4300	<10	MA MA	MA .	<300 <300	M M
Total Metals		•	•	•	•		•							-
Eliver	200 Ag	41,000	1,100	1,100	<1,008	<1,000	<1,000	<1,000	4,500	<10·				
Aromie	00 Au	17,000	11,000	15,000	4,900	8,600	13,000	20,000	2,700	<10	#A #A	MA.	**	M .
Corlup	** **	94,000	80 ,,000	76,000	69,000	50,000	100,000	57,000	16,000	<100	<u> </u>	•	MA	M
Codelus	on Od	4700	<500	330	<500	<500	1,200	400	<800	<		186 . 186 .	MA.	MA.
Chrenius 	es Cr	37,000	22,000	32,000	11,000	12,000	28,000	27,000	8,600	<10	-		IM.	MA
Horoury	es Ng	97	140-	420	830	740	390	1,200	70	4.5		- MA - MA	MA	- 184
Lond	** 75	40,000	100,000	80,000	100,000	250,000	160,000	45,000	57,800	4.,	•		MA .	
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TABLE 6.2 (Continued). SOIL SAMPLES

		8-11 2332-330 ug/kg*	9-12 2332-331 ug/kg*	Semp 81k #2 2332-337 ug/L	Lab Blk B-P102 ug/kg*
PCBs	:				
PCB-1262	,	<80	<80	<80	<80
PCB-1254		<160	<160	<160	<160
PCB-1221	:	<80	<80	<80	<80
PCB-1232	i, s	<80	<80	<80	<80
PCB-1248		<80	<80	<80	<80
PCB-1260		<160	<160	<160	<160
PCB-1016		<80	<80	<80	<60

Detection limits of squeous samples are lower than soil samples.

*dry ut basis

NA - Not analyzed for this parameter

MA - Not analyzed for this parameter

* units un/l

Note: only analyte concentrations greater than detection limits have been reported

IM = Not measured

Samp Bik - Sample Blank

Trav Bik = Travel Blank

NO = Not detected

LTI

TABLE 6.4. WIPE SAMPLES

	Consentration (vg/vipe)	(rd/nibo) potestien fielt 235-310	Vip Consentration (My/uipe)	o de 2-351 Petection Liuit (vg/vipe)	carcant Lat lan	e 63 2-352 Dotaction Light	Vip. 233	n 86 1-353	Olpo Gamio 2332-354	Otto
4,4" - tor 4,6" - tor 4,4" - tor	4.2 1.1 0.00	0.01 0.01 0.01	1.7 9.29	9.01	(up/elpo)	(up/iripo)	(nt/nibe)	Potection Lieft (ug/pipe)	(ratalitation so	tection Limit (ug/sipe)
ID a Not Detected	ı		0.42	0.01 0.01	0.65 0.53	0.01 0.01	4.1 0.2 9.6	6.61 6.61 6.81	Rep 61 Rep 62 100 100 100 100 100 100	0.01 0.01 0.01

TABLE 6.5. WATER CRITERIA

	national Drinking MCLG (1)	PRIMARY WATER REGULATIONS MCL(2)	NEW YORK STATE GROUNDWATER STANDARDS (3)	DATA RANGES
		ug/L	ug/L	ug/L
Arsenic	50	50	25	<10-10
Barium	1,500	-	1,000	<10-16
Chromium	120	50	50	< 10-97
Lead	20	50	25	<5-330
bis(2ethylhexylphthalate)	•	· •	4,200	110-170

Footnotes:

- 1. MCLG Maximum contaminant level goal; proposed values taken from 50 Federal Register 46936 (November 13, 1985).
- 2. MCL Maximum contaminant level; interim guidance levels.
- 3. Water Quality Regulations, New York State Department of Conservation 11/29/84 and Environmental 8/31/78.

TABLE 6.6. SOIL CRITERIA

	DATA RANGES ug/kg	NJ Action 1		
Volatile Organics	<500	1,	• • • • • • • • • • • • • • • • • • •	
Extractable Organics	<300-1,700	10,	<i>#</i>	
	NJ Background ^(1,2) ug/kg	U.S Background ⁽³⁾ ug/kg	Data Ranges ug/kg	NJ Cleanup Levels ⁽³⁾
Silver	NA	90	<1,000-4,500	5,000
Arsenic	NA	1,100-16,700	2,700-20,000	20,000
Barium	NA	NA	16,000-100,000	NA
Cadmium	1,000-4,000	10-1,000	<500-1,200	3,000
Chromium	5,000-48,000	1,000-1,500,000	8,600-39,000	100,000
Hercury	NA .	10-4,600	70-1,200	1,000
lead .	1,000-180,000	2,000-200,000	45,000-250,000	250,000-1,000,000
Selenium	10-40,000	10-5,000	<1,000	4,000

Footnotes:

- 1. NJ Dept. of Environmental Protection, Summary of Approaches to Soil Clean Up Levels, January 1987.
- 2. NJ Cleanup Objectives cited to put the level of soil contamination into perspective. No New York Guidance is available.
- 3. NJ established surrogate or action level (1 ppm volatile organics in soil).

identified. The NJ regulations listed are in no manner applicable to the Fort Totten, NY site. The New Jersey Department of Environmental Protection guidance related to soil clean-up levels is included n Appendix G.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The objective of this investigation was to provide a preliminary investigation to determine the presence or absence of chemical contamination which may have resulted from former DOD activities at Fort Totten and to determine the potential for contamination of local groundwater or surface water supplies. To accomplish this objective 5 groundwater wells were installed, and the following samples were collected from areas most suspect of contamination: 5 groundwater samples, 10 soil samples, 4 wipe samples, and 3 sediment samples.

New York State groundwater standards served as a basis for comparison. In the absence of New York soil clean-up regulations, New Jersey soil slean-up guidance levels were compared to analyte concentrations found.

7.2 Results

Volatile organic compounds were below detection limits for soils and groundwater, semivolatile organic compounds were measurable in some soil samples but well below NJ Clean-up criteria. PCBs in all soil samples were below detection limits. Although most total metal concentrations were below New York State groundwater standards, chromium and lead concentrations in MW-2 and MW-4 exceeded these. Mercury at 1200 ug/kg in (S-7) and

1500 ug/kg (Sed-3) exceeded NJ Cleanup criteria of 1000 ug/kg. Petroleum hydrocarbons concentrations of 220,000 ug/kg, 280,000 ug/kg and 150,000 ug/kg in Sed-1, Sed-2 and Sed-3, respectively exceeded NJ action levels. DDT, DDD, and DDE were detected in all wipe samples collected in buildings #619 and #624.

7.3 <u>Conclusions</u>

- There is little evidence of volatile or semivolatile organic compound contamination in groundwater, soils, or sediments.
- No evidence was detected of PCB contamination in soils near former locations of electrical transformers.
- Lead contamination in the groundwater of MW-2 and MW-4 may be attributed to past DOD activities. Lead is a common contaminant at former defense sites. However, chromium disposal has not been identified in available literature and may or may not be attributed to former defense activities. Mercury disposal onsite was reported. Therefore, mercury contamination in soils and sediments may have resulted from past DOD activities.
- Petroleum hydrocarbon concentrations in sediments exceeded NJ action levels. This contamination may be attributed to past DOD activities due to numerous oil spills at the site, that had occurred during DOD operations.
- The presence of pesticide contamination in buildings #619 and #624 is most probably due to past DOD activities. The storage of pesticides in these buildings had been reported in available information.
- Although results of the EM survey presented in Section 4 resulted in heavy interference from utility lines and debris, it is unlikely that drums or ordnance are buried onsite. This conclusion is based upon interviews with coast guard personnel, interpretation of survey data and existing drawings and available information regarding past DOD activities onsite.
- The east end of building #619 does not appear to contain a sealed room.

7.4 Recommendations

Since the Scope of Work for this evaluation was to "confirm or deny" the presence of environmental contamination, it is recommended that a Risk Assessment at a minimum or an RI/FS at a maximum be performed since contamination does exist on this site. However, it should be noted that the groundwater on this site is not used as drinking water nor does it flow towards a drinking water source. Groundwater on this site discharges into Long Island Sound which is actually the Atlantic Ocean. The primary threat of concern to the environment and human health on this site appears to be the presence of mercury contamination in soil, marine sediments, and in the floor drainage system of building #615.

8.0 REFERENCE

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- Water Quality Regulations Surface Water and Groundwater Classifications and Standards Section 703.5, 11/30/84 and 8/31/78.
- New Jersey Department of Environmental Protection Summary of Approaches to Soil Cleanup Levels. January 1987.
- Code of Federal Register Sections 261.31 & 261.33. July 1, 1985, pg. 266 and 374.
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APPENDIX A WELL LOGS AND FIELD DATA

GEOLOGIC DRILL LOG

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25	8	2547	1.7	9 - N- N-20		•		25-26 Brown, wet, compact, of sand 26-26.3 fray, silly they long 26.3-26.9 Brown, silly f. sand Compact, appears dry		MAN : O Rud - Morm
30	9	30.32	1.9	8-12- 71- 3	2	•	<u> </u>	26.9 Gay, wet, sily f. and Gray, wet, compact, frame silt. Intertedolog fine to are apparent.	and	Hnu = O Rud = Mon
								Pugered to 33 a.o.b. Flushed ougers w/110gal potable water. Set: 10', 2', 101 slot RHC 82-22' below Ground. Riser: 25', 2" PVC 22' below to 3'abov Gr	56 18 00	
								7 bags · Sound 33 · 20' 11/2 bucket Bettonite pelkt 8 bugs Eye I Portland Benbrit 18 · 0'	l <u>s</u> 20-18 [°] Comm	
		-				·		1		

GEOLOGIC DRILL LOG

PRO	JEC	T: P. F	F+ 7	Hen		JOB 6	vo. 332		HE E	2_	1 -	_	6 NO. 1-Z
100	AT	ION	:				UMPTLS:					70	Tall With
			NY ACTOR: K	0.0 1		WS	ECTOR: M.Z	2460		34 6 Wil	: 6		
			CME 7		77.	2.2011	.Ex: J. 2	Buck	100	714:50		6/6	127
UFIL	<u> </u>	70.	CHIE I	<u>יל זגעלי</u> .	: (w. 5		WEATHER:	T	67 0	IN: 4/47	er (2. 2	F1. (84.)
- 1	1 1/2 1/2	"	J (A)				Kam. Cool	1	15'	below	Gri	CH	ed .
CAS	ING	e E 7	T M HO	E CV	10. JEEN	(115	DEILLING FLO	112:	707	05 F.OC	. 13	مز غرا	m, fi.):
22 / MG.	o Mind	يدمعهم	BLOWS PER	ROLK 9s CORF	ancera a	3,78		CRIP	i		4	72.57	NOTE: OF COME OF THE OFFICE OFFI
2 3.5	7.	5A	6 MICHE	REC.	Ĕ		9					•	27.
7/	0.2	1.4	4-7-6-3			<i>j</i>	Brown , Dry	1008	e 80	ls w/	,,		Hau = 2
-	-						f-m soud & stones, O 6 DK. org				1		Radino
				-			Meny sur. 5.20 Cinder	PST 73			. 1		•
1 5	1.5	1. 8	3-4-5-4		•		No Descrit Fo	11: # A	Ldk	bras	, i		Hau : O
) <u>-</u>	4.5	1.0	7.0.1			1	MIRON BIDI	31.10	رمص	SITT W	7		Rud: no
							for sand, e Some Back	Ly,	وماء	smell Si	S orr ₄		
3 م	5-7	1.2	5-8-9-1				5.5.8 11 Läh	Sioner	per la	el, 210 151	;		HHH20
	┨	-					lucke, silt wifew small s	pose	and	cinder	7) 'S.		Radz nor
							5.8.6.5 Brow 4. sand w	Isitt		_			
	 						6.5-7.0 Bious	√f. Sc	and the	466			
5 4	7.5	1.8	9-11-30-2				7.5.8.3 Bow w/f. send	n, ma	37, 5	1,64,61	11		Hau= O
Ë	9.5					ļ,	Q. 2.95 R	20126	Make	6 3 700	6		Red = HO
-	1			1			moist, fra	or BU!	sili	awed a	7.		ł
							9-9.3 black f-c sand	,0100	st, h	9054,			
5		ł :	- cale	L -		1	Brown , loos	E , 191	OIST	, SIH W	A.		Hau = C
) <u>\$</u>	1020		5-60/11				Sund and Ell	R 400 . 5	one	Small	ı		Red : no
	*		or refu		12'		Stones and	E1 4 G		•	İ		
5 6	15-17	1.7.	14-7-12-				16-16 Brewn. w/f, swaf skru, r čia	ans e La s	my.	3000 500			HAU = O Bud > no
							Chan little f.	send.	The	(4041MB	% Q		da.
							16.3.17 Has. 8		1015	, bose	f.		
SAM	Tree ?	TYPE	;; oon, 57		74 747 5	Com	PLETION NOTE				Bot		16 No. :
ء دو و مغ	Àor	e Col	PF D	071	e A	<u>L</u>					1 11	ω	<u>. 2</u>

* Moved Brokele = 10' West (away from Blog #24)

PROJECT: Army Co E fr	T. He is	708 No. 2332	3HEET 2	BORING A	ve.i.
SOIL SOIL SOIL	TOLL &	207	ESCEIPTION AND LASSII ICATION	71.17	OTE; ON; TEL·IE TOTOTA TOTOTA TOTOTA LIMG.
7 20-22 1.8 8 D-A-1		Bruss, more and sitt inches the apparent	ss, stiff, f. sand layers alooral ch. Thin lowings t.	the state of the s	4u = 0 .d = u =
s & 25-27 1.7 6-8-10 1		e.o.b. 2			nu=0 ad=ka
		Riser 86 Sund- 740	10,2° PVC /4'A 9: 30/50 ONW F 12'-25'	hat Sho	n græ
		Grout -	Pollers 3/6°; 16 10-12. Portland Type I bug:	1 1	.¥
			•		•
			et p		
					·
	1	7			

PROJECT:	JOB NO. 2332	SHEET	BORING NO.
Aimy Co E . Ft To HE!	COOK VINATES:	2 or <u>2</u>	MILLI-3
Queens Nt		The second second	30'
DRILL CONTRACTOR: R. R	INSPECTOR: M.Z	irbel ELEVII	: 6/3/87
DEILL RIG : IMF	DPILLER: J.	Ricksar TIMISH	6 6 /6 /27
HOLE SIZE: SAMPLEY:		GFELLNAVIATE	Cornifer):
CASING LETT IN HOLE CUI.	Warm, Close	dy 12.56 bel	sa Ground
CASING LETT IN WILL CO.	None (43)		Coepin, Ex. j.
A B SOIL ROLK	· t		Note: ens
BLOWS 90	E E	AND	A D conte server
PY ILLY SER CORY	• 1 T Z 1	SSIFICATION	H & Comin To 1 of
4 (1.4)	• •	- d Jases January	ET.
0 1 6-7 1.5 4-5-7-19	f. sand (f. si	nidry, loose, lossing and I sell) many am	Man 2 Rad 2 morn
	l lucade ·	m, word, f. savel	700-00-
		au small stores Al	×40:
	et .5-20 · M	oticeble black st	Sail .
		z - probably fuelon	'
2 2,5 254.3 1. 2 4- 9-6-5	2500 burn,	meit , low , for	Del smell
		t. Speined black and Priv black ciarless.	
 	Actice ble en		MN = 2 m
3 52 5.7 1.8 10-8-7-4	5.8.5.8 B.n	mand frame	d brouthing 20
		to back, f. sunder	
	1 1	nt of a 5.5	Rud: norm
	& Am B. 4 B. a	um, most f. sund, by.	4/4
			-
+ 7.5 7.5 1.7 1+12-12-12	m. e.d. C	of, loos, f. sand, u l'glones.	Hus O Rus : Aora
	7, 10, 10	o granda .	
5 126 10-12 1.9 6-4-8-12	Memoral to for	panent at h	Han 3 in hal.
	A.H Brown, and	his, love fine game	Was - On brank
	11-185 B. COLL	Branch and The	had kuyob:
	11.547 B10wm	ment, kings of said	Rod: work
	w/sili, with	ment, liese, france	Check M, Dias
6 13515-17 25 19-15-14-18	1" Stone at top	a lance E amola	Now 2.5 Continu
│ ┠╶┩┈┥┈┥┈ ┥	of found of s	t, loose, f. sand.	معدوه يه مره مد
	,		Per el promo
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		÷	!
SAMPLE TYPES: SI: STI IT SPOON, STI SHEEZY	THEE COMPLETION NOTE	5 :	BOZING NO.:
L' LOIR CELF O . OTHER			Mw-3

	oje e		F+ 70	Hen		3rZ	No. 32	301EET _2. 17 _2.			
30000	32.6	Secondary.	501L 2:005	KOLL Tool:	EIEVATION	100 m	•	E 223-13-712W NZ CL-25517-16-8-7-114	37112	MOTEL CITE	
7	4		15-17-15-2				Brown, wet feel a mal	hard, forand d shower	sir,	Water ~ 20' Hata • C Red = Off	
5 8	25-27	1.8	91-16-17-20				lamination	Brown, were hard,	f. sand	How + C Rad: norm	
					·	·	and sitt	_			
7 4	30 31	1.7	9-17-23-38		-		throughout			Hun = C Rad = um	
							1	el at reinaung		Concachor winter o 3 Minhor	
	-						51	sen 19-29'	1		
							61/2 boog 40/	60 Office Starts	Lot 15-17'		
-	-						11 1/2 bags	Portland 17 ps.	I Gad		
					ŧ						
				-							
-			-								
- 3	10:74 I	217 3	5 - r r N . 57	· 5/// ·	7 7 - 61	cr		115°1 ; ;		ws 1/2.: u-3	

PNC:NLE Z

PROJECT:	l l	JOB NO. SHEL			BORING NO.		
Bray CoE - Fr. Totten		2332 2 00			Grains ELEV. TOTAL U		
LOCATION:	COOK	UINATLT:			••••	12 *	
Queens, NY			5. (4.4.	1/1			
DRILL CONTRACTOR: R+R lat	1. 11157	ECTOR: M.Z	24 300	0/6	/87		
DEILL RIG : CME 75	UFI	LLEX: J. B	ucksa or	17/10/10/10/20	6/0	771 860	
HOLE SIZE: SAMPLEY: (W. 70.	WEATHER:					
	<u> </u>	Clear, Cool	<u> </u>	Colew	Cipu		
CASING LETT IN HOLE COIN.	/2@W&1115:	None (HS	A)	01 40.7	- 02 /	nu foij:	
S SOIL ROCK	3 0			4.6 11	١	Note: er	
3 W 2 2 E X E		DES	CRIPTIO	~	13.5	moter adoles	
TO BER CORF	2 3 4		SSIFICA	TION	12 %	Carin To 1 07	
A 6 MUS REC.	8					27.	
1 .5. 1.6 8-6.9.9		3-1.5 Black ,	muist, look	: , at - Fame	<u>ارا</u>	Hau : O	
2.5		te. sile. man	y small sto	mes. Ciade	13	Red : more	
	. }	and Black	stains of	1-1.5	1	Hg: Oat	
	1	1.5-2.5 Brow	m, 1010157	100 SP, Fi	_ [hole	
	1	Sand . Rust				<u></u>	
5 2 25 - 1.3 24 - 9 - 12 - 15		Brown Muis	t, loose, f	sand . to	٥	Hn 4=0	
4.5	1	Brown, Muis Rusgo redo	lish stain	ing in	1	Red a mo	
		horizontel	bands	-	1	14 = OAT A	
 	ı	1				1	
2 502 () 6 10-8 12		Brown, wet,	Bred C.	and as leed		4/ -	
3 5-7 / 6 9-10-9-12						How = O Rost = mone	
h-ddd	l	(1-3" thick);	Con or of	r. sand	1	Hg = 0 0 0 6	
 					'	1 '	
	+	and discret	e peices	8 647	Ì	ken for at 3	
J-1		11 80000		,		 	
5 - 7.5 O 15-22-8-16	į	No Recover	7 .			1	
<u></u>	·	Ì		•	1	1	
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			, , , , , , , , , , , , , , , , , , , 			 	
4 1012 1.8 5.44-6		10-10.8 Brown	n, wet, los	e, f. soul	,]	4000	
<u> </u>		w/21+		•		Rod: ho	
1		10.6-11.2 Bros	10 راجه رسم	ose, fim	Ĭ		
		sand, tr. s	elt e	•			
		11.2-12 Gray	w/8.00	mu Tiles,		1	
	1	wet, stiff	, chy				
		12.0.6. 12	7 7			•	
		Screen: 6-11	3 5',01 5	61, PVC ,2'	'		
	-			i P			
	1	Seemed 1 5 -17'	80/60 OM	e for the file	27	7 5	
-	200	Scend 1 5-12' South 1 4-5' Browl 2-4'	Partine 1	1/Re-	brief n	buder 1/	
SAMPLE TYPLS:	con	PLETION NOTE	· · · · · · · · · · · · · · · · · · ·	1	BOZI	VG NO.:	
53: STI IT STOOM, ST: SMELTY	7-25		•	·]	_	,-4	
FIXOR COLE D & OTHER	·				11/2	<u>/</u>	

All Pepths unesured from surface of road.

THE Christy mochan was used to create 12" hub in mad.

THE Riser was trimmed flush with road and Bod box was installed install of protection.

	JEC	_	F	•	T- 4		703	NI. 332		r 2			S No.
L 06	At	ON	:		10 A			VINATES:				_	701 With
Qu												<u> </u>	
			4C TOR			Ist he	WSF	ECTOR: M.Z.	v 60/	27 600	• 6/	<u> </u>	127
7714	L >	16:	CAT				271	LER: J. B.	CKSOV	7//			6/27
HOL	£ :	TIRE	: =	Airi	748 K	: (w., s	es;	WEATHER: Clear, Suna		17' be	_		nd (EL)
CASI	N6	-E7	7 111 6	1046	CV	10./280	(i 17.		10: 76	7 05 700	ek it	7E 7	ing EL.):
1 6		. }	5011		ROCK	Ł							Note: en
10:16 10:16	مومر مد مومر مد	Sciner o	BLOW	J5	90 · Coke REC	1 Tevora	JARAN AY	ł	CRIPTI AND SSIFIC		216.10	71.37	war certain war betwee Care to re- income, ET:
がい	c-2		6 mi					05 Topsoil	sod, Di	K Brown,	11	-	HANE O Red : no
				_	•			.5-2 Brown,	moul,	100se, f.a			1
5 2		1.9	3-2-4	ج.				2.5-8.5 Brown f. sand	ar It		*		Haus C Radinosm
	4.5							13.5- 4 Brown	on o Gray	hard, P.			
								sand + s. 16 4-4.5 Gray, thin 6-000			راد		
3	5.7		3-4-8					5-5.5 Brown,	اع رخوارب	H, sill a	3/		Hau = O Rad : norm
		-5/	c <u>on P</u> 0					5.5-6.8 Gm. mont, 100 s	4 brown	, laneauto id , tr. 51 l	,		米
5 4	7.5 -	1.7	5-2-9	15				Brown Ma	157 1005	P. P. Same	3		序状 Hau 20
-	9.6		, , , , , , , , , , , , , , , , , , , 				,	tr. silt. Nu and pobbl	acous	9.5	İ		Radino
, 5	10-12	1.5	8.8.	5-7				10-11.5 Brown	L company of	14 maroy 5	. 1	 «	Haus O Rade + O
		-		┪	4	waa dijiri		5 mull stor 11.5.11.6 Grow 11.6-12 Bro	105 wells	boso, m-c s F, wet, f.	- A		
		-											
56 _	15-	1.9	4-7-11	:43				15-15,7 80 f-m sand, 15.7 16.4 G	r. s. lt		6		Mad : not
		• • •		-				ids. It man	g them b	414 /amu			
-								1		•			
			<u> </u>		<u> </u>	!	1	2 0 3 0000	•		7-		16 N'O.:
SAM	TLE	TYPL:	• •			27 7421	. 😘	itetion were	<i>.</i>				-5

Hit sewer pipe at ~7' - moved well NE ~4'
Bored to 7.5 in New hole

THE CONTRACTOR OF THE PROPERTY

PROJE	CT:	F+ 70	4		208 23		Z CT		BORING	e Ne."	
54-12 140. 54-17 140. 54-17 6 6	John Yee	501L	KOLL Gr Cori	ELEVATOR	707	7.e	5CXID713 ANT LASS 18 1CA	N TIPN	21112	MOTE; ON: MAY TERELS MAY TERELS CALFORNES BY LEWG. ETC.	• !
22	1.8	3 - 7 - // - //				20-20.3 Bro f. sand w/1 20.5-21 Gv Clay, thin 21-22 Bros 2-m sand	laminutes on, loose i	snry Hs.		Hnu= O Rad=norm	
5 8 25-	.5	10-21-19-2	-	•	٠	Ton . 8' Brown	mp bray mo	stod,	1	Hauso	- ``
27						Slift, weth Bottom, 2 Bi M. said E.O.b. 28	ack, loose	+ صدر		Rid: auri	•
						Set-well	' ;				-
						Screen - 16 Riser - 18 Scal - 30/	7, 2" PVC,. 7, 2" PVC 50 OHuwa	OI Elot Flimtskáj	13-2 13 to 13'-2	3 2'a boug 5' - 6%)- • Vz (
						Bentonite -	3/e" po //ots	9-1	"	11/2 buc	
						Grout · Pa	w/Benton	r I ceme to powed	at 11.	-0	
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WATER CONTENT

TEST NUMBER MW B - S8 MW - 2 S7 MW 3 S7 MW 4 S4 MW 5 - S 7 TARE NUMBER LR YF IP IL IN IF A. WEIGHT OF WET SOIL + TARE 352.74 418,64 446.09 386.72 178.04 B. WEIGHT OF DRY SOIL + TARE 292.74 347.78 397.26 348.50 157.14 C. WEIGHT OF WATER, W = 1(A - B) 60,00 70.44 48.83 28.72 20.90 D. WEIGHT OF TARE 51.34 51.53 51.53 49.30 51.43 E. WEIGHT OF DRY SOIL, W = 1(B - D) 241.40 276.25 345.73 299.20 95.71 F. WATER CONTENT, W = (C/E = 100) 24.9 23.8 14.1 9.4 21.8 TEST NUMBER AU 5-57 TARE NUMBER LS LS LS LS A. WEIGHT OF DRY SOIL + TARE 240.68 C. WEIGHT OF DRY SOIL + TARE 240.68 C. WEIGHT OF DRY SOIL, W = 1(B - D) 189.44 F. WATER CONTENT, W = (C/E = 100) 1/9.2 76/87 WYDRO MCTELS
TEST NUMBER MUSC SIL + TARE MUSC SUBJECT MUSC SIL + TARE NUMBER MUSC
TEST NUMBER
TEST NUMBER MW B - S8 MW 2 S7 MW 3 S7 MW 5 MW 5 S8 MW 2 S7 MW 3 S7 MW 5 MW 5 S7 MW 5 S7 MW 5 MW 5 S8 MW 5 S7 MW 5 S7 MW 5 S7 MW 5 S8 MW 5 S7 MW 5 S8 MW 5 S8 MW 5 S8 MW 5 S8 MW 5 S8 MW 5 S8 MW 5 S8 MW 5 S8 MW 5 S8 S8 S8 S8 S8 S8 S8
TARE NUMBER TARE NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF DRY SOIL, Was (B-D) TARE NUMBER A. WEIGHT OF DRY SOIL, Was (B-D) TEST NUMBER A. WEIGHT OF DRY SOIL, Was (B-D) D. WEIGHT OF WET SOIL, Was (B-D) D. WEIGHT OF WET SOIL, Was (B-D) D. WEIGHT OF WET SOIL, Was (B-D) D. WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (B-D) D. WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (B-D) D. WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (B-D) D. WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (B-D) D. WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (B-D) D. WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (B-D) D. WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (B-D) D. WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (B-D) TARE NUMBER A. WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WEIGHT OF WATER, Was (A-B) D. WEIGHT OF WATER, Was (A-B) D. WEIGHT OF WATER, Was (A-B) D. WEIGHT OF WATER, Was (A-B) D. WEIGHT OF DRY SOIL, Was (B-D) D. WEIGHT OF DRY SOIL, WAS (B-D) D. WEIGHT OF DRY SOIL TARE
TARE NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE S/2 74 1/8, 2 4/6.07 36.672 178.04 B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF WATER, Wu*(A-B) 60,00 70,44 48.83 28.22 20.90 D. WEIGHT OF DRY SOIL, Ws*(B-D) 241.40 296.25 345.73 299.20 95.71 F. WATER CONTENT, W*: (C/E = 100) 24.9 23.8 14.1 9,4 21.8 TEST NUMBER A. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WATER, Wu*(A-B) 30.60 D. WEIGHT OF WATER, Wu*(A-B) 30.60 D. WEIGHT OF DRY SOIL, Ws*(B-D) 189.44 F. WATER CONTENT, W*: (C/E = 100) 1/6,2 7/6/87 WYDRO MCTELS TARE NUMBER A. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WATER, Wu*(C/E = 100) 1/6,2 7/6/87 WYDRO MCTELS TARE NUMBER A. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WET SOIL + TARE L. WEIGHT OF WATER, Wu*: (A-B) 31.86 D. WEIGHT OF WATER, Wu*: (A-B) 31.86 D. WEIGHT OF TARE SI. 86 SI. 91 SI. 92 SI. 94 SI.
A. WEIGHT OF WET SOIL + TARE 352.74 418.63 446.09 3.66.72 78.04 B. WEIGHT OF DRY SOIL + TARE 292.74 347.78 397.26 348.50 157-14 C. WEIGHT OF WATER, W_*(A-B) 60,00 70.44 48.83 26.22 20.90 D. WEIGHT OF TARE 5/.34 5/.53 5/.53 49.30 57.43 E. WEIGHT OF DRY SOIL, W_*(B-D) 241.40 296.25 345.73 299.20 95.71 F. WATER CONTENT, W: (C/E = 100) 24.9 23.8 14.1 9.4 2/.8 TEST NUMBER 15. A. WEIGHT OF WATER, W_*(A-B) 30.60 D. WEIGHT OF WATER, W_*(A-B) 30.60 D. WEIGHT OF DRY SOIL, W_*(B-D) 189.44 F. WATER CONTENT, W: (C/E = 10D) /G, 2 76/87 WYDLO MOTELS TARE NUMBER A. WEIGHT OF WET SOIL + TARE 48.83 B. WEIGHT OF WET SOIL + TARE 168.83 108.91 156.09 153.61 135.22 C. WEIGHT OF WATER, W_*(A-B) 31.86 31.91 51.43 50.43 50.42 D. WEIGHT OF DRY SOIL, W_*(B-D) 136.97 27.00 104.64 103.18 04.20
B. WEIGHT OF DRY SOIL + TARE 292.74 347.78 397.26 348.50 157.14 C. WEIGHT OF WATER, W _u : (A-B) 60,00 70,44 48.83 28.72 20.90 D. WEIGHT OF TARE 5/.34 5/.53 5/.53 49.30 57.43 E. WEIGHT OF DRY SOIL, W _s : (B-D) 241.40 296.25 345.73 299.20 95.71 F. WATER CONTENT, W: (C/E: 100) 24.9 23.9 14.1 9,4 2/.8 TEST NUMBER 40.557 TARE NUMBER 271.28 B. WEIGHT OF WATER, W _u : (A-B) 30.60 D. WEIGHT OF WATER, W _u : (B-D) 189.44 F. WATER CONTENT, W: (C/E: 100) 1/6,2 76/87 WYDLO MOTELS TARE NUMBER 4W3 \$7 MW2 \$7 MWS \$7 MWS-\$7 MW 18 \$8 B. WEIGHT OF WATER, W _u : (A-B) 34.4 D. WEIGHT OF WATER, W _u : (A-B) 34.4 D. WEIGHT OF WATER, W _u : (A-B) 34.4 D. WEIGHT OF WATER, W _u : (A-B) 34.4 D. WEIGHT OF WATER, W _u : (A-B) 34.4 D. WEIGHT OF DRY SOIL, W _s : (B-D) 136.97 27.00 104.66 103.18 DW.20
C. WEIGHT OF WATER, W _W * (A - B) 60,00 70,44 43.83 28.22 20.90 D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W _S * (B - D) 241.40 296.25 345.73 299.20 95.71 F. WATER CONTENT, W * (C/E * 100) 24.9 23.8 14.1 9.4 21.8 TEST NUMBER A. WEIGHT OF WET SOIL + TARE 271.28 B. WEIGHT OF WATER, W _W * (A - B) 30.60 D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W _S * (B - D) 189.44 F. WATER CONTENT, W * (C/E * 100) 1/G, Z TARE NUMBER A. WEIGHT OF WATER, W _W * (A - B) 30.60 D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W _S * (B - D) 1/G, Z TARE NUMBER A. WEIGHT OF WET SOIL + TARE 168.83 108.91 156.09 153.61 135.22 C. WEIGHT OF WATER, W _W * (A - B) 31.86 31.91 51.43 50.43 50.42 E. WEIGHT OF DRY SOIL, W _S * (B - D) 136.97 27.00 104.66 103.18 04.20
D. WEIGHT OF TARE 5/34 S/53 5/.53 49.30 S/.43 E. WEIGHT OF DRY SOIL, Wa = (B-D) 24/.40 296.25 345.73 299.20 95.71 F. WATER CONTENT, W: (C/E:100) 24/.9 23.8 /4.1 9.4 2/.8 **Secol!** TEST NUMBER
E. WEIGHT OF DRY SOIL, W ₆ :(B-D) 241.40 296.25 345.73 299.20 95.71 F. WATER CONTENT, W: (C/E:100) 241.9 23.8 14.1 9,4 21.8 TEST NUMBER A. WEIGHT OF WET SOIL + TARE 271.28 B. WEIGHT OF DRY SOIL + TARE 240.68 C. WEIGHT OF DRY SOIL, W ₆ :(B-D) 189.44 F. WATER CONTENT, W: (C/E:100) 1/6,2 7/6/87 WYDRO MOTELS TARE NUMBER A. WEIGHT OF WET SOIL + TARE 48.8 30.60 TEST NUMBER A. WEIGHT OF WET SOIL + TARE 48.8 30.60 TEST NUMBER A. WEIGHT OF WET SOIL + TARE 48.8 30.60 D. WEIGHT OF WET SOIL + TARE 48.8 30.60 TO MUL S7 MUL S7 MUL S7 MUL S7 MUL S7 MUL S8.8 30.60 D. WEIGHT OF WET SOIL + TARE 168.8 31.91 156.09 153.61 135.22 C. WEIGHT OF WATER, W ₀ : (A-B) 31.9 51.43 50.43 50.42 E. WEIGHT OF DRY SOIL, W ₆ : (B-D) 136.97 27.00 104.64 103.18 04.20
TEST NUMBER A. WEIGHT OF WET SOIL + TARE E. WEIGHT OF DRY SOIL, W. = (B-D) F. WATER CONTENT, W = (C/E = 100) A. WEIGHT OF DRY SOIL + TARE E. WEIGHT OF DRY SOIL, W. = (B-D) F. WATER CONTENT, W = (C/E = 100) A. WEIGHT OF DRY SOIL, W. = (B-D) F. WATER CONTENT, W = (C/E = 100) A. WEIGHT OF DRY SOIL, W. = (B-D) TARE NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF WET SOIL + TARE C. WEIGHT OF WATER, W. = (A-B) D. WEIGHT OF WATER, W. = (A-B) D. WEIGHT OF TARE 31.86 31.91 51.43 50.43 50.43 50.43 50.43 50.43 50.43 50.43
TEST NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W. * (B-D) F. WATER CONTENT, W * (C/E 100) TARE NUMBER A. WEIGHT OF WET SOIL, W. * (B-D) TARE NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF WET SOIL + TARE B. WEIGHT OF WATER, W. * (A-B) C. WEIGHT OF WATER, W. * (B-D) C. WEIGHT OF WATER, W. * (B-D) C. WEIGHT OF TARE C. WEIGHT OF WATER, W. * (B-D) C. WEIGHT OF TARE C. WEIGHT
TARE NUMBER A. WEIGHT OF WET SOIL + TARE Z71.28 B. WEIGHT OF DRY SOIL + TARE Z71.28 C. WEIGHT OF WATER, W_=:(A-B) D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W_=:(B-D) F. WATER CONTENT, W=:(C/E = 100) Z/6/87 HYDRO UCTILS TEST NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE LB - B3 C. WEIGHT OF WATER, W_=:(A-B) D. WEIGHT OF WATER, W_=:(A-B) D. WEIGHT OF TARE 31.86 31.91 S1.43 S0.43
TARE NUMBER 2. 15 A. WEIGHT OF WET SOIL + TARE 271.28 B. WEIGHT OF DRY SOIL + TARE 270.68 C. WEIGHT OF WATER, W_= (A-B) D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W_= (B-D) F. WATER CONTENT, W= (C/E = 100) 76/87 WYORD WOTELS TEST NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF WATER, W_= (A-B) D. WEIGHT OF TARE 31.86 31.91 51.43 50.43 50.43 50.43 50.43 50.43 50.43 50.43 50.43 50.43 50.43 50.43 50.43
A. WEIGHT OF WET SOIL + TARE
B. WEIGHT OF DRY SOIL + TARE 240.68 C. WEIGHT OF WATER, W=2(A-B) 30.60 D. WEIGHT OF TARE 51.24 E. WEIGHT OF DRY SOIL, W=2(B-D) 189.44 F. WATER CONTENT, W=2(C/E 100) /G, 2 76/87 WYDRO MCTALS TEST NUMBER TARE NUMBER A. WEIGHT OF WET SOIL + TARE 68.83 B. WEIGHT OF DRY SOIL + TARE 168.83 C. WEIGHT OF WATER, W=2(A-B) 34.4 D. WEIGHT OF TARE 31.86 S1.91 51.43 50.43 50.42 E. WEIGHT OF DRY SOIL, W=2(B-D) 136.97 27.00 104.66 D. WEIGHT OF DRY SOIL, W=2(B-D) 136.97 27.00 104.66 D. WEIGHT OF DRY SOIL, W=2(B-D) 136.97 P. WEIGHT OF DRY SOIL, W=2(B-D) 136.97 P. WEIGHT OF DRY SOIL, W=2(B-D) 136.97 P. WEIGHT OF DRY SOIL, W=2(B-D) 136.97 P. WEIGHT OF DRY SOIL, W=2(B-D) 136.97 P. WEIGHT OF DRY SOIL, W=2(B-D) 136.97 P. WEIGHT OF DRY SOIL, W=2(B-D) 136.97
C. WEIGHT OF WATER, Wy: (A-B) 30.60 D. WEIGHT OF TARE 51.24 E. WEIGHT OF DRY SOIL, Ws: (B-D) 189.44 F. WATER CONTENT, W: (C/E 100) /G, Z 7/6/87 WYDRO MCTELS TEST NUMBER 4W3 \$7 MW2 \$7 MW5 \$7 MW5-\$7 MW 18 \$8 TARE NUMBER A. WEIGHT OF WET SOIL + TARE 168.83 108.91 156.09 153.61 135.22 C. WEIGHT OF WATER, Wy: (A-B) 31.86 31.91 \$1.43 \$0.43 \$0.43 \$0.42 E. WEIGHT OF DRY SOIL, Ws: (B-D) 136.97 27.00 104.64 103.18 \$4.20
D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W ₈ :(8-D) 189,44 F. WATER CONTENT, W: (C/E : 100) /G, Z 7/6/87 HYDRO UCTILS TEST NUMBER A. WEIGHT OF WET SOIL+TARE B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF WATER, W ₀ : (A-B) 31.0 D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W ₈ :(8-D) 136.97 27.00 104.66 103.18 104.20
E. WEIGHT OF DRY SOIL, W, = (B-D) 189,44 F. WATER CONTENT, W= (C/E = 100) /G, Z 7/6/87 WYDRO UCTELS TEST NUMBER A. WEIGHT OF WET SOIL+TARE B. WEIGHT OF DRY SOIL + TARE [68.83 108.91 156.09 153.61 135.22 C. WEIGHT OF WATER, W ₀ = (A-B) 31.2 D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W ₁ = (B-D) 136.97 27.00 104.66 103.18 04.20
F. WATER CONTENT, W: (C/E = 100) /G, 2 7/6/87 NYDRO UCTULS TEST NUMBER A. WEIGHT OF WET SOIL + TARE 168.83 108.91 156.09 153.61 135.22 C. WEIGHT OF WATER, W: (A-B) 31.86 31.91 51.43 50.43 50.42 E. WEIGHT OF DRY SOIL, W: (8-D) 136.97 27.00 104.66 103.18 84.20
7/6/87 WYDRO MCTOLS TEST NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF WATER, W=: (A-B) D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, W=: (B-D) 136.97 108.91
TEST NUMBER TARE NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF WATER, Wa: (A-B) D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, Wa: (B-D) 136.97 108.91
TEST NUMBER TARE NUMBER A. WEIGHT OF WET SOIL + TARE B. WEIGHT OF DRY SOIL + TARE C. WEIGHT OF WATER, Wa: (A-B) D. WEIGHT OF TARE E. WEIGHT OF DRY SOIL, Wa: (B-D) 136.97 108.91
A. WEIGHT OF WET SOIL + TARE 168.83 108.91 156.09 153.61 135.22 C. WEIGHT OF WATER, War (A-B) 31.00 31.91 51.43 50.43 50.42 E. WEIGHT OF DRY SOIL, War (B-D) 136.97 27.00 104.66 103.18 04.20
B. WEIGHT OF DRY SOIL + TARE [68.83 108.91 156.09 153.61 135.22 C. WEIGHT OF WATER, Wo : (A-B) 34-A D. WEIGHT OF TARE 31.86 31.91 51.43 50.43 50.42 E. WEIGHT OF DRY SOIL, Ws : (B-D) 136.97 27.00 104.66 103.18 84.20
B. WEIGHT OF DRY SOIL + TARE (68.83 108.91 156.09 153.61 135.22 156.09 153.61 135.22 156.09 153.61 135.22 156.09
C. WEIGHT OF WATER, Wo = (A-B) 34.4 D. WEIGHT OF TARE 31.86 31.91 51.43 50.43 50.42 E. WEIGHT OF DRY SOIL, Ws = (B-D) 136.97 27.00 104.66 103.18 94.20
D. WEIGHT OF TARE 31.86 31.91 51.43 50.43 50.92 E. WEIGHT OF DRY SOIL, W. = (B-D) 136.97 27.00 104.66 103.18 84.20
E. WEIGHT OF DRY SOIL, W. = (B-D) 136.97 27.00 104.66 103.18 04.20
E WATER CONTENT WALE TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL
- WEIGH CONTENT, W. (C/E 1100)
TEST NUMBER LAWY CU
TARE NUMBER TARE NUMBER
A. WEIGHT OF WET SOIL+TARE
B. WEIGHT OF DRY SOIL + TARE 143.59
C. WEIGHT OF WATER, Wat(A-B)
D. WEIGHT OF TARE SD.69 E. WEIGHT OF DRY SOIL, W. = (B-D) 72.50

METCALF & EDDY. ENGINEERS, 005154

GRADATION CURVES

ACCT. ABBR. USCE - FT. TOTTBU LABORATORY NO. OIB - GEOTECH **UARIOUS** 2332 FIELD SAMPLE NOS. CHECCH! DATE TESTED JU TESTED BY_ DES CENT PASSING BY WEIGHT 100.5 2 100 CLAV 800 500 500 HYDROMETER ANALYSIS +00 ORAIN SIZE IN WM. 500 £00. FINES 900 300. 90C 90C 900 10. SAMPLE DESCRIPTION 50 20 •0 +0 80 70. 005 METCALF & EDDY, ENGINEERS. 00 NUMBER OF MESH PER INCM, U.S. STANDARD 23.8 00 <u>=</u> 01 マンタ **٤** ٧ ず SAND Sm-me Smml BL 20-22 ,22,02 SIEVE ANALYSIS COARSE Ĕ GRAVEL SIZE OF OPENING IN INCHES KEY CORPOR 00 06 09 51 Z FIELD SAMPLE NO. COBBLES MW-2 MW-3 2 2 Ş 8 THOUSE TO CEMIATER THES RE-

GRADATION CURVES

ACCT. ABBR. U SCE

FT. TOTTEN

OIB - GEOTECH

FIELD SAMPLE NOS. <u>VARIOUS</u> **Jum** TESTED BY W. CHE CCH 1 DATE TESTED PER CENT PASSING BY WEIGHT 100 HYDROMETER ANALYSIS 900 CRAIN SIZE IN MM. 500 FINES 900 900. 900 900 700 SAMPLE DESCRIPTION 80 20 80 100 METCALF & EDDY, ENGINEERS. HUMBER OF BESH PER INCH, U. S. STANDARD Wc~21.8 SAND (Sm.ml) PEDIDE ES Œ SAMPLE ANALYSIS LZ-,52 COARSE 20 20, SIEVE STEE OF OPENING IN INCINES 08 X **2/12** 00 00 53 57 FIELD SAMPLE NO. COBBLES MW 18. 18 300 8 PER CENT RETAINED BY WEIGHT

LABORATORY NO. FIELD SAMPLE NO. DATE TESTED	018 -C MW-2 July	57 (20'-22'	ACCT ACCT TESTE	. NO.	2	FT. TOTIES 332 Hecchi
	WT. TAR	AL DRY SAMPLE + TARE . EN 1 P . AL DRY SAMPLE .	108.91 31.91 77.00			
COLUMN DATE ON DATE	WT. PAS	AINED #10 SIEVE			PLUS #10 _	
WT. PASSING #10 SII WT. TARE # WT. PASSING #10 SII	EVE + TARE	/E (approx. 115 gm max.)				
WASH PORTION PASS WT. RETAINED #200 WT. TARE #					•	·
WT. RETAINED #200				•	4+	

U.S. BIEVE NO.	CUMULATIVE WEIGHT RETAINED	% RETAINED
3		
2"		
1 1/2"		
1;"		
3/4"		
3/5"		
NO. 4		
NO. 10		
PAN		

U.S SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% PASSING 10% RETAINED	% TOTAL SAMPLE RETAINED B
#2 0			
#40	0		a.o ·
#60	1.92		2.5
#140	6.01		7.8
#200	13.56		12.6
PAN -200			
WASHED -200			
101AL -200			

- 1	k PLUS	#10	+	8	MINUS	#10	×	Ä
			+				×	A

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LABORATORY NO. FIELD SAMPLE NO. DATE TESTED	018-GEOTECHI MW-3 57 (26-22 July 6,7 1987	ACCT. ACCT. TESTED	
	WT. TOTAL DRY SAMPLE + TARE	168.83 31.96 136.97	
• •	WT. RETAINED #10 SIEVE		% PLUS #10
SPLIT PORTION PASS	ING #10 SIEVE (approx. 115 gm max.)		
WT. TARE # WT. PASSING #10 SIE			
Wash Portion Pass Wt. Retained #200 S			

U.S. SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% RETAINED
3		
2" "		·····
1 1/2"		
1"		
2/4"		
3/8"		
NO.4		0
NO. 10	2.11	1.5
PAN		

U.S. SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% PASSING 10% RETAINED	% TOTAL SAMPLE RETAINED B
#20	10.14		7.4
840	19.89		10.1
#60	22.46		16.4
#140	43.83		32.0
#200	58.06		62.5
PAN -200			allinodartalling
WASHED -200			
TOTAL -200			

8 = % PLUS #10	+ % MINUS #10 × A
8	+ <u></u> ×A

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WT. RETAINED #200 SIEVE

WT. PASSING #200 SIEVE

DATE TESTED	July 6,7, 1987	ACCT. I	W. Ct	332 tcc#1
	WT. TOTAL DRY SAMPLE + TARE	143,59		
- 	WT. TOTAL DRY SAMPLE _	92.90	· · · · · · · · · · · · · · · · · · ·	
	WT. RETAINED #10 SIEVE	<u>,</u>	% PLUS #10	
•	WT. PASSING #10 SIEVE		% MINUS #10	
SPLIT PORTION PASSI	NG #10 SIEVE (approx. 115 gm max.)			
WT. PASSING #10 SIE	VE + TARE	<u> </u>		
WT. TARE #			•	
WT. PASSING #10 SIE	Æ			
WASH PORTION PASSI	NG #10 SIEVE		met.	and the second
WT. RETAINED #200 SI	EVE + TARE		٠,	•
WT. TARE #			*\$1	
WT. RETAINED #200 SI	EVE			•
MT. PASSING #200 SIE	₩.			

U.S. SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% RÉTAINED
3		
5		
1 1/2"		
1"		
3/4"		
3/8"		
NO. 4		
NO. 10		
PAN		

U.S. SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% PASSING 10% RETAINED	% TOTAL SAMPLE RETAINED 8
#20	0		0
#40 G.Z	6.35		6.8
#60	15.79		17.0
#140	50,82		64.7
#200	60.23		64.8
PAN -200	· · · · · · · · · · · · · · · · · · ·		
WASHED -200			
101AL -200			

B = % FLUS #10 + % I	AINUS #10 × A
----------------------	---------------

■=×A

	018-GEOTECH MW 6 57 20' GA	ACCT. ABI ACCT. NO TESTED BY	and Constant
	WT. TOTAL DRY SAMPLE + TARE WT. TARE # 1 C WT. TOTAL DRY SAMPLE	153.61 50.43 103.18	•
	WT. RETAINED #10 SIEVE		% PLUS #10
WT. PASSING #10 S WT. TARE # WT. PASSING #10 S			
WASH PORTION PAS WT. RETAINED #200		•	

U.S. SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% RETAINED
3		
2 ··		
1 1/2"		
F"		<u> </u>
3/4"		
3/8"		•
NO. 4	0	0
NO. 10	0.95	0.9
PAN		

U.S. SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% Passing 10% retained	% TOTAL SAMPLE RETAINED B
#20	11.56	·	11.2
#40	28,17		27.3
#60	48 91		47.4
#140	21.82		79.3
#200	87.77		85.1
PAN -200			
WASHED -200			turing general
101AL -200			. E. Jagananaan

•	-	*	PLUS	#10	÷	*	MINUS	#10	×	A
8					٠				×	_

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WT. PASSING #200 SIEVE

LABORATORY NO	018-6	OTCH		CCT. ABBR.	USCE	- FT.	Tone
FIELD SAMPLE NO	. MWS	57 (20'	<u> </u>	CCT. NO.	•	<u> 2332</u>	
DATE TESTED	July 6	2 1987	_ · 11	STED BY	W.C	HECCH	1
	WT. TOTAL	DRY SAMPLE + TARE	156.09)			
	WT. TARE A	· •	51,43	3	·		
	WT. TOTAL	DRY SAMPLE	104.60	6			
	-				•		
	WT. RETÄIR	NED #10 SIEVE		%	PLUS #10		
	WŤ. PAŠSII	NG #10 SIEVE		%:	MINUS #10	·	
	•	•					
SPLIT PORTION P	ASSING #10 SIEVÉ	(approx. 115 gm max.)					
WT. PASSING #10	SIEVE + TARE		· · · · · · · · · · · · · · · · · · ·				
WT. TARE #	-				• •		
WT. PASSING #10	SIEVE	_ <u></u>			,		-
						•	
WASH PORTION P	ASSING #10 SIEVE					· .	
WT. RETAINED #2	00 SIEVE + TARE .						
WT. TARE #						•	
WT. RETAINED #20	M RIEVE			Ş	11		
	-		a				
WT. PASSING #200	u Dieve						
U.S.	CUMULATIVE		U.S	CUMULAT	rive & i	PASSING	% ТОТ
SIEVE NO.	WEIGHT	% RETAINED	SIEVE NO.	WEIGH	IT 10%	RETAINED	SAMPI
		100.17111100	110.	ne i Ain	ا س	A	REIAIN

U.S. SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% RETAINED
3		
5		
1 1/2"		s and the second
شوا		
2/4"		
2/8"		
NO. 4	0	6
NO. 10	3.65	3.5
PAN		

U.S. SIEVE NO.	CUMULATIVE WEIGHT RETAINED	% PASSING 10% RETAINED	% TOTAL SAMPLE RETAINED B
#20	10.15		9.7
#40	17.19	la lat. Net they	16.4
#60	25,22		24.1
#140	35.16		33.6
#200	41.60	:	39.7
PAN -200			Antonia in Manifesti Antonia in Manifesti
WASHED -200			
101AL -200			

8	%	PLUS	#10	+ (16	MINUS	#10	×	A
B	_			4				×	A

GRAIN SIZE ANALYSIS-HYDROMETER METHOD

Project USCE - FT - TO THEW	_ Job No	2332	-
Location of Project QUEENS NY	Boring No. <u>MW</u>	18 Sam	ple Na SB
Description of Soil	_ Depth of Sample	SS	-27'
Tested By W. CHECCH	_ Date of Testing _		
Hydrometer analysis		,	•
Hydrometer no. 152 H G, of solic	1s = 2.65	& = _	(100
Dispersing agent Na PO3	Amount 4%	Wt. of sc	oii, w. <u>84,30</u>
Zero correction	Meniscus correction		

Date	Time of reading	Elapsed time, min	Temp.,	Actual Hyd. reading R _a	Corr. Hyd. reading A,	% Finer	Hyd. Corr. only for meniacus R	from Stable 8-5	√ +	K from Table	D. mm
1-137	2057	0	20							,0137	
		.25		+60							
		.5		160	·		·				
		1		+60							
		1.5		59	56	66.4	60	65			.028
		2		55	52	61.7	56	7.1			.025
		2.5		52	49	581	53	26			1023
		3		50	47	55,6	51	7.9			.022
		3,5		47	44	52.2	48	8.8			.02
	·	4		45	42	49.8	46	8.8			1020
		11		34	31	36.8	35	10.5			.01
		21		28	25	29.6	29	11.5		***************************************	1010
		43		22.5	19.5	23.1	235	12.45			.00
		77		9	16	19.0	20	13.0			1005
		167		15,5	12.5	14.3		13.6			1003
·	0355	718		13	10	11.9	14	14.0			.001
										·	

R. - Remail - zero correction + C.

th finer = R/eVW

D-IN/IA

00.p 15

		GRAI	N SIZE	ANAL	YSIS-F	IYDHC	METE	HME	HOD			•
Project .	USCE	- 1	1.70	TIEN	·····	Job No.		23	32	···		•
Location	of Proj	ect QU	eens	NY	<u></u>	Boring (No. Mu	1-2	Sample	No 5	7	
Descript	tion of S	oli				Depth o	of Sampl	•	20'-2	<u>z'</u>		
Tested E	3y	J. CH	دودا	<u> </u>		Date of	Testing	2 Vr	46	198	2	
Hydrom	-			(5)					•	•		
Hydrom			H		ol polide	_ 2.	45		1	.00		
nyuloili	G(B) 110.	lia!	Dn.	0, '	Di SUNUS		4%	 (77.00
							•			_ Wt. of	soil, W	77.00
Zero co	rrection		· · · · · · · · · · · · · · · · · · ·		M	eniscus	correction	on	1			
	I			· · · · · ·	}	<u> </u>	i	· · · · · · · · · · · · · · · · · · ·				
Deta	Time of	Elapsed time,	Temp.,	Actual Hyd. reading	Corr. Hyd. reading	%	Hyd. Corr. only for meniscus		√ ↓	K from Table	.	٠
Date <u> </u>	reading	Min	స్త	A,	R,	Finer	R	6-5	V 1	10137	D. mm	
15/:/	611.	.5	2	53	50	64.9	54	7.4		10.31	.052)
				42	49		43	9.2	1.51 · · · · · ·		.0416	
		5		37	34		38	10.1	47		.035	
		2		31	28	36.4		11.11			.032	9
		3		25	22	عا، 28		12.0			.027	4
		4		20	17	22.1		12.9	•	~ .	.024	
		12		9	<u></u>	7.8	10	14.7			.015	
		60		3	0	0	4	12.6			.0069	7
			<u> </u>	-								· N
												
					-							

 $R_{\rm e} = R_{\rm educif}$ - zero correction + $C_{\rm r}$

% finer = RyayW,

D-KVL

		GRAI	N SIZI	E ANA	LYSIS-I	HYDRO	OMETE	R ME	THOD		
Project	<u>usce</u>	~ PT	TOT	rew_		Job No)		<u> 233</u>	2	
	on of Proj otion of S			•							57
Tested Hydron	By <u>W</u>	i CHE	CCH.	<u></u>		Date of	Testing	70	46	19	
Нудгоп	neter no.	152	H	G,	of solids	, = ;	2,65	> 	å =	1.00	<u> </u>
Dispers	sing ager	n <u>Na</u>	103	· · · · · · · · · · · · · · · · · · ·	A	mount _	4%			_ Wt. o	f soil, W.
Zero co	prrection				M	eniscus	correcti	on	1		
Date	Time of reading	Elapsed time, min	Tomp.,	Actual Hyd. reading R _o	Corr. Hyd. reading R,	% Finer	Hyd. Corr. only for meniscus R	from Table 6-5	√ +	K from Table 6-4	D. mm
1/0/37	2119	0	20							DI57	
	ļ	0,5		+60				<u> </u>			
	ļ	1	-	57	54	39.4		6.8	47		,035
	<u> </u>	1.5		51.5	485	35.4	52.5	7.7			.0310
	ļ	2		49	46	33.6	50	8.1			.027
				44	41	29.9	45.	89		1	0230

Date	reading	min	₹0	R.	R,	Finer	R	6-5	V 🕇	6-4	D. mm
7/0/37	2119	0	20							DIS7	
		0.5		+60							
			_	57	54	39.4	58	6.8	47		,0357
		1.5		51.5	485	35.4	52.5	7.7			.0310
•		2		49	46	33.6	50	8.1			.0274
		3		44	41	29.9	45.	8.9	•		0236
		4		41	38	27.7	42	9.4			10210
		8.5		33	30	21.9	34	10.7			.0154
		22		24	21	15.3	ध	12.2			.0102
		55.5		17.5	14.5	10.6	18.5	13.25		, r	.0067
		148		12	9	6.6	13	14.2			10042
7/:7		695		8	5	3.6	9	14.8			,0020
		5 v -									

% finer = PL(a)W.

D=K\\U\)

(26)

GRAIN SIZE ANALYSIS-HYDROMETER METHOD

Project USCE - PT. TO TIEN	Job No
Location of Project QUEENS, NY	Boring No. HW 4 Sample No. S4
Description of Soil	_ Depth of Sample10 - 11.2
Tested By W.CHECCH;	Date of Testing July 6 1987
Hydrometer analysis	
Hydrometer no. 152 H G, of solid	2.65
Dispersing agent Nafo 2 A	mount 4% Wt. of soil, W. 92.90
Zero correction3	feniscus correction

Date	Time of reading	Elapsed time, min	Temp.,	Actual Hyd. reading R,	Corr. Hyd. reading R,	% Finer	Hyd. Corr. only for meniscus R	L from Rabio 6-5	√ ‡	K from Table 6-4	D. mm
1/6/27	2553	0	20	7.						10137	
-	-	.25		34	31	33.4	35	185			,0888
		.5		30	27	29,1	81	11.2			10648
				27	24	25,8	28	11.8			.047
		2		23	20	21.5	24	12.4			.034
				20	17	18.3	21	12.9	٠		.024
		9		17.5	14.5	15.6	185	13.25	•		10166
		19		15	12	12.4	16	13.7			,0110
		31		14	11	11.8	ıs	138			.009
		81.5		10	7	7.5		14.5			10058
		172		9	6	6.4	10	14.7			.004
											:
									· · · ·		
									· · ·		

 $R_i = R_{externil}$ - zero correction + C_i

28 6.35

% finet - ALOW.

2-20/14

GRAIN SIZE ANALYSIS-HYDROMETER METHOD

Project USCE - FT. TOTTEN	Job No	7332	• .	
Location of Project QUEEUS, NY	Boring No.	MUS Sam	ple No. 57	
Description of Soil	Depth of S	ample 20 1	(SAND)	
Tested By W. CHECCH!	_ Date of Tes	sting July 6	1987	
Hydrometer analysis (C)		•		
Hydrometer no. 152 H G, of solid	ds = 2.6	<u>s</u>	1.00	
Dispersing agent Na PO2	Amount	1%	Wt. of soil, W.	81.80
Zero correction	Meniscus cor	rection	•	
	e ·			

	Date	Time of reading	Elapsed time, min	%C	Actual Hyd. reading R _a	Corr. Hyd. reading R _e	% Finer	Hyd. Corr. only for meniscus R	L from Table 6-5	√ ‡	K from Table 6-4	D. mm
)	7/6/37	2403	.25		20	17	16.5	21	12.9		,0137	.098
			.5		14	11	10.7	15	138			.072
			1		12.5	9.5	9.2	13.5	14-1			1051
			1.5		11.0	8	7.8	12	14.3	- Tay		1042
	-		2		10.5	7.5	7.3	11.2	14.4		,	.036
			3		10	7	6.8	H	14.5			1030
-			4		O	6	5.8	10	14.7			.026
			9.5		8.5	58	513	4.5	14.75			.017
			21.5		8	5	4.8	9	14.8			10/14
			72.	•	ی	3	2.9	7	15.2			1006
		16	162		5	2	1.9	6	15.3			,0047
•					ارجاء اليس							700 1
							-					
							30-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1					
•												
•							· · · · ·					
٠												
•									J.,			
						1						

R. = R_{const.} · zero correction + C. 0.95

% finer = R/e/W

D-KVU

ZN 28.17

GRAIN SIZE ANALYSIS-HYDROMETER METHOD

Project USCE - PT TOTE	UJob No Z332_	
Location of Project QUEBUS, N.	Y. Boring No. MW S Samp	ole No. <u>\$7</u>
Description of Soil	Depth of Sample	<u> </u>
Tested By W. CHECCH:	Date of Testing TV4 6	1987
Hydrometer analysis (4)	•	·
Hydrometer no. 152 11 G. c	of solids = 2.65 a = _	1.00
Dispersing agent NA POS		Wt. of soil, W. 104.66
Zero correction	Meniscus correction	

(15)

Date	Time of reading	Elapsed time, min	Temp.,	Actual Hyd. reading R _e	Corr. Hyd. reading R _a	96 Finer	Hyd. Corr. only for meniscus R	L from Table 6-5	√ \ +	K from Table 6-4	D. mm
7/6/87	2108	0	20							10137	
		.25		+60							
		۰5		460					-27		
		1		60	57	54.5					
		1.5		67	54	51,6	58	68			,0 292
		2		55	52	49.7		7.1	,		.0258
		_ 4		51.5	485	46.3	52.5	いり			.0190
		10.5		41	38	36.3	42	9.4			.0130
		18.5		36.5	335	32.0	37.5	6.5			.0101
		36		31	28	26.8	32	11.11			10076
		63		26	23	22.0	27	11.9		·	.0059
		158		20	7	16.2	21	129			10039
7/7	23.5	63		12.	11.5	11.0	15.5	13.75			10050
											·
								·			
						l_i		*			

R. P. Remark 2910 correction & C.

3.65

34 17,19

D-N/IR

APPENDIX B

MONITORING WELL COMPLETION DIAGRAMS

GROUND WATER INSTAI	LLATION	PROJECT:	ArmyloE 23	32	MELLN	0.
DRILLING CONTRACTOR:		COORDINATES:				
BEGUN: 8/2/27 SUPERVISOR:	02.2. · be	/ / / / / / / / / / / / / / / / / / / /	L SITE:	144255	LEVEL D	
FIRISHED 6/8/67 DRILLER: J.			P. 011E-		Paka TEAST D	
					DEPTH IN	
REFERENCE POINT & ELEV	ATION:	TOP OF SURFACE	CARING 22			17 +7
3' * 3' * 4"		- TOP OF RISER CA	_ / .			63.57
concrete pad	4		GROUND SURFACE		0	61.5
GENERALIZED A A	╉╻╏╏╠	[* *]	DIA.: 4°		<u> </u>	6173
GEOLOGIC LOG	dial late	SURFACE CASIN	G: TYPE: SHOW	1		
				!		
- 1]].* .* <u>}</u>					
1			. •			
· •		•	•			l
			•			
1	N. I. I.	- BOTTOM OF SUR	FACE CASING		2.8	58.7
1			i vot evolue			
	E X		•			
İ	X X					
		BACKFILL:	ernt - B bags			
	a z		mirture			
	X X		DIA.: 2"			1 .
		RISER CASING:	DIA.: 3" TYPE: PUC			
	ž x	rent of the state		•		}
			·		18	43.5
		TOP OF SEAL	No.		10	
		ANNULAR SEAL:	TUDE 3/ Read	- e fer	1	
		1/2 buch	TYPE: 3/e Bent	٤.		
		BOTTOM OF SEAL	•	,	20	41.5
1		PO LION OF SEVE	•			
					22'	39.5
	- 	TOP OF SCREEN	•			
						1
ł		FILTER MATERIA	L: TYPE: Officen Flie	154°		
		•				
<u> </u>			2" TYPE: PU			
		OPENII	NG WIDTH: 0/ TYPE	Slot		
		•	•	** .	3Z '	29.5
•		BOTTOM OF SCREE	EN		102	2
						*
METHOD DRILLED : 64" HSA	1-1-4-	BOTTOM OF SUMP		*		
					33'	28.5
METHOD DEVELOPED :	OLE DIAMETER	BOTTOM OF HOLE				
Bailing	,9'- -	COMMENTS:				•
TIME DEVELOPED :	• •		•		<u> </u>	
4 hours					F	二三
					Me	ecalf & Eddu

GROUND WATER INSTALLATION PROJECT: SOE NO.		WELL	NO.
DRILLING CONTRACTOR: COORDINATES:	2332	mu	
BEGUN: 6/+/27 SUPERVISOR: M.Z. + be WELL SITE:	Tu., 222		
FIRISHED 6/6/8 DRILLER: J. Buckson	15'	LEVEL (DEPTI
REFERENCE POINT & ELEVATION:		DEPTH IN	E
3 - 2" - 5's fee! TOP OF SURFACE CASING:	l		1,
S'A 3'A 4" TOP OF RISER CASING:	ı	2.3	16
Concrete pod GROUND SURFACE	. [2.0	5
GENERALIZED A TO THE STATE OF T			+
GEOLOGIC LOG SURFACE CASING: TYPE: Stee!	Ì		
	1		
X X BOTTOM OF BURFACE CASING		2.7	5
		•	
a a		*	
BACKFILL: TYPE: Portland I 10 bags and Barton.	Type I		
I I I 10 bogs and Barken.	A Lamina		
E BISER CASING DIA: 2"			
X X NISER CASING: TYPE: PUC		•	
TOP OF SEAL		10	4
ANNULAR SEAL: TYPE: 3/g" / burded benton to per	16132	•-	
BOTTOM OF SEAL	- · <u> </u>	12'	41
	Ţ.		
TOP OF SCREEN	1	14'	4
	Γ	· .	
FILTER MATERIAL: TYPE:		-	
7 8ays 30/50 Offens		•	
SCREEN: DIA.: 2" TYPE: PU			
OPENING WIDTH: 0/	PE: S/of		
		24	34
BOTTOM OF SCREEN	ľ		
METHOD DRILLED:			
6% id. HSA		25'	33
METHOD DEVELOPED : MOLE DIAMETER	نا	60	
Bailing COMMENTS:			
TIME DEVELOPED :		-	. .

GROUND WATER INSTALLA	TION	Army Cot FI Toten 2332		WELLN	10.
DRILLING CONTRACTOR:		COORDINATES:		1//4	<u> </u>
R+R International			·	·	
BEGUN: 6/3/67 SUPERVISOR: M.	2 1-6-1	WELL SITE:	WATER	LEVEL D	EPTH/ELEV
FINISHED: 6/7/67 DRILLER: J. 8	ucksa	- :	12.	56 60/2	count
				DEPTH IN	ELEV. IN
REFERENCE POINT & ELEVATI					
3-2" " 5' steel posts 1 4-4	4 " <u>→</u> _	TOP OF SURFACE CASING:			
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<u>1</u>		ł	2.2	59.28
3'23'24"		TOP OF RISER CASING: 2'		2.0	57.1
concrete pad	1 7 11	GROUND SURFACE			3 /• 1
GENERALIZED		DIA.: 4"		-	
GEOLOGIC LOG		SURFACE CASING: TYPE: Stee!	.		l
			1		
J4 z			ł		
- - - - - - - - - -					
	x k	·	ł		
[x] 7	x d	•			
. 11 ×				•	
. 🕅 🛪			ŀ		54.3
\ s	2 16	- BOTTOM OF SURFACE CASING	ļ	2.8	24.2
[12		l	,	ŀ
[*]	×		. 1		
[*]	I I		[
[X	=-	BACKFILL: // / bogs TYPE: Portland Py & Bonton to	ipe I	,	
<u> </u>		4 Banton to		ļ	
*	*	** ◆			
[*_	1	_ DIA: 2 *	1		İ
[.*]		RISER CASING: TYPE: PUC	1		
	n x	•	Į		
x I	*				
z.	1		İ	1.5.0	42.1
l ≅	\otimes	TOP OF SEAL	ſ		
l ⊠	- 1 88		J		
1881	₩	ANNULAR SEAL: TYPE: Buntonite 3/4 bucket Rikh 3/a	~		
l 🔀		-74 occurs paners 3/8			40.1
	─	BOTTOM OF SEAL "		17.0	4041
			1		
			1		70 1
. **		TOP OF SCREEN		19.0	38.1
		the second second second second	İ		
		FILTER MATERIAL: TYPE: 60/40	1		
		7 bags One was	1		
	<u>-]}: </u>	Pha 18 AUT			
	-4:4-	SCREEN: DIA.: 2 TYPE: "PI	16		
	7.3	OPENING WIDTH: 01 TYPE:	56		
[- 1:4				
				29.0	28.1
	اسهبنها	BOTTOM OF SCREEN	ŀ	<u></u>	
		•		•	
		BOTTOM OF SUMP	- 1		
METHOD DRILLED:		SO OM OF SUMP	ı		30 1
614 Huger	<u>::::]</u> .	ROTTOM OF MOLE	ľ	30 O'	27.1
METHOD DEVELOPED . HOLE E	NAMETER	OTTOM OF HOLE			
	4'	11			·, [
7		COMMENTS:			
TIME DEVELOPED :		•		. 2	<i>p</i> • pag
4 hours				₿,	

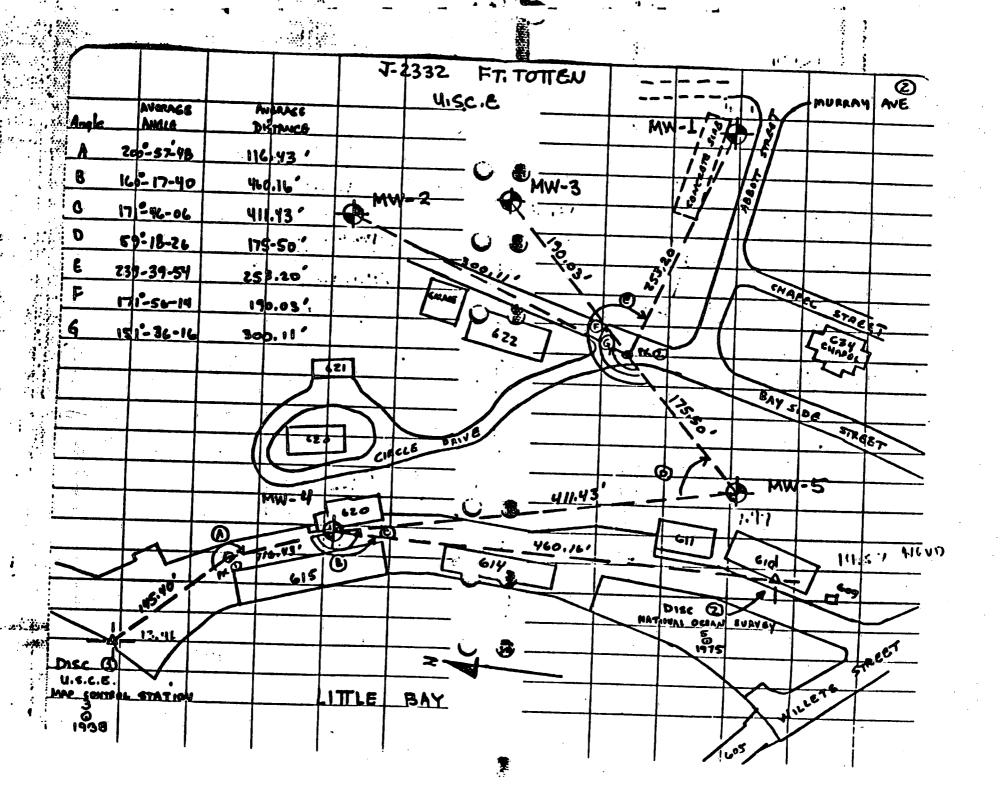
Metcall & Eddy

GROUND WATER INS	TALLATION	Army Cof FI. Token 23:	3 2.	WELLN	۵.
DRILLING CONTRACTOR:		COORDINATES:			
R+R Internation BEGUN 6/6/87 SUPERVISE	14				
FILISHED 6/6/87 DRILLER:	DR: 10 2 1- 60 /	WELL SITE:	WATER	REVEL D	EPTH/ELEV
FINISHED B/0/87 DHILLEN.	J. BUCKSOY		5.7	6000	brouse
REFERENCE POINT & E	LEVATION:			DEPTH IN	ELEV. IN
_		con că diu di diu			İ
		10POF Road Box			
•		TOP OF RISER CASING:			
		GROUND SURFACE			112.15
GENERALIZED GEOLOGIC LOG	Y	DIA.:			11.92
asorogic rog		T' TYPE:			
Y Y —					
				ľ	
	1417.1	_		ŀ	
A Company of the Comp	7 x x x				
	M = 1 = []				1
•					
•	1 2 2	•			
•					
		BACKFILL: TYPE:			
		8/4 bog Rotland Type I coment affects			
	2 2	Come at suffere to	ik		l
	X	DIA : 2 *]	ļ
		RISER CASING: TYPE: PVC		ŀ	
	_ z	•		* -	
					0 15
	A	TOP OF SEAL		4	8.15
			,		}
	- 	ANNULAR SEAL: TYPE:			l
		3/5" Bratonite 1 backet			
	₩ -	BOTTOM OF SEAL		5	7.15
•		•			1
				٠.	6.15
		TOP OF SCREEN		6	10.10
•				j	1
		FILTER MATERIAL: TYPE:			ĺ
		21/2 bags 30/50 Obour			٠
		SCREEN: DIA.: 2" TYPE: PVE	2		•
•		OPENING WIDTH:			
•		Slot	'		l
		-		11.	1.15
•		BOTTOM OF SCREEN			<u> </u>
METHOD DRILLED :		BOTTOM OF SUMP		ļ	
61/4" id. HSA				۱.,	0.15
	HOLE DIAMETER	BOTTOM OF HOLE		12	
METHOD DEVELOPED:			_		
Builing	g'	COMMENTS: Set in concrete no	مدمه	" <i>y</i>	•
TIME DEVELOPED :	ä	•		•	7.17
4 hours	٠			L	
		•		Me	ican & Eddy

	GROUND WATER INSTALLATION	PROJECT: Army Co E Ft Totten 2332	WELLA	10.
	DRILLING CONTRACTOR: R. R. International	COORDINATES:		
	BEGUN 6/5/87 SUPERVISOR: M. Zirbe	WELLSITE: WATER	R LEVEL D	ERTH/ELEV
	FILISHED: 6/0/27 DRILLER: J. Bucker	12	below	. Comment
٠	REFERENCE POINT & ELEVATION:		DEPTH IN	ELEV. IN
	3-2" ×5' 5me/ m	— TOP OF SURFACE CASING:	2.2'	'
	والودم	TOP OF RISER CASING:	2.6'	27.15
ı	\$ 3 × 4"	,	2.6	35 0
ł	GENERALIZED A VI	GROUND SURFACE	ļ	25.0
I	GEOLOGIC LOG	SURFACE GASING: DIA.: TYPE: STEE!		
ł			·	•
ł				
I	[A] [A] [A]		ĺ	
	\ \ \ \ \ \ \ \ \ \ \ \ \ \			
١	\[\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		·	İ
İ	. 4 .	1	2.5	22.2
ı	2 2	6- BOTTOM OF SURFACE CASING	E.B	
1	[k			
1	x x			
١	[*	BACKFILL: TYPE:		
1	*. *.	Post band type I coment albantonite		
ı		pourror		
1	I I I I I I I I I I	RISER CASING: TYPE: PUL		İ
	*_ *_			
ł	R	**		1/ 0
1		TOP OF SEAL	9	16.0
١		•		
1	₩ ₩	- ANNULAR SÉAL: TYPE:		
1	₩ ₩	3/8" Beinkonik pollots		14.0
ı		BOTTOM OF SEAL	"	
1				
ı		- TOP OF SCREEN	13	12.0
ı				
		-FILTER MATERIAL: TYPE: 50/50		
ı		Odus Wintshop	,	
		- SCREEN: DIA.: 2" TYPE: PUC		
		OPENING WIDTH: 01 TYPE: 5%		
l				
			23	2.0
	图 数	- BOTTOM OF SCREEN		
	METHOD DRILLED:	- BOTTOM OF SUMP		
	6 14 id HSA	- BOTTOM OF HOLE	25	0.0
1	METHOD DEVELOPED : HOLE DIAMETER			•
1	Bailing - 9'-	COMMENTS:		
	TIME DEVELOPED :	•		/: <u> </u>
1	4 hrs		E.	₹

APPENDIX C WELL SURVEY DATA

					Milyana Milyana		<u>.</u>	A PROPERTY OF A PARTY		: :				
				:		丁 23		FICE	ा जा	en				®
	BENCE	MARK	1 D	sc 2;			- -	1	BM 1	+ 5.22	19.79		14.57	(HGVD)
	Na Na	tional	OCENN S	URTO	\[\s \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\	سنة -	J	70 1	15.31	17,78	-7.32	12.47	
	- 4	JASHIM GT	D.C	•	1975	<u>/</u>			BM 2	+3.21	16.67	- 4 .32	13.46	
	PER!	TIDAL	DATUM:	SECTION			-		TP 2	+ 5.44	17.59	-452	12.15	Concrete MW-4
	·	(301)	443-B46	.	X872171 (00)	Chec. Bu	B.	U		ļ		-5.67	11,92	Hr. Po. Kur-
	(0	,00 A	Mea	low le		l	-	;	·			-5.72	11.87	lo Pr.hw-4 PVC. Riser
	10	.28 =	Mean 1	ou Wa-	er_/			J	BM-1	+ 4.03	18.60	-3.02	14.57	éise 2
**** ****		16= 1	.G.V.7	٥.	Di	2		•	TP 3	+ 12.46	28.80	-2.26	16.34	
	3	.85= A	lean T	De	= 17.	73 MLLV	(v)	•	TP 9	411.35	38.50	-1.65	27.15	MW - 5
	7	42= A	can H	gh Wa	ter	14.57		7			X	-11.49		top pyc. Mw-5
		78= /	Kan H	gh Hig	h Wat			لہ				- 13.5	25.0	GROWND MW-5
	BEUCH	MARK :	*2 7	oisc 1	¥.			•	TP. 5	+19.89	53.64	- 4.75	33.75	
*	Un	ted 54.4	& Corps	of Bmi	NC6AZ				_	+8.19	61.39	-0.44	53.20	
:: :*		ap Contro	1	l *1	(mg			J			X		61.13	DA GROSSIL
					1738		•	•			 	-0.33	61.06	TOP PVC MW-2
·	6	LEVATION	= 16	.34 {	M.L.W	3		ن				-2.5	58.9	GROUND MW-2
	}		OR	t			, –	_	79.7	+ 5,63	64.91	-2.11	59.28	TOP PROTECT:
.		16.6	25	base 3	·	,	•	•	_1 <u>1.''</u>		- 'X	-5.78	59.13	TOP PUC MW-3
			2 1	rrm?				3			<u> </u>	- 7.8	~ .	GAOUND MW-3
			13.46	NEVD			i		r.p. 9	+ 3.21	66.78	1		DP PROTECT
							ý		1.]. 0	~ 5,61	~	-3.38	63,40	MW-1
	•	. .										-5.3	61.5	MW-1



APPENDIX D RAI ANALYTICAL DATA

Field Identification: 2332-301 Fort Totten Well #1 Laboratory Number: 10,465-3

Parameter was	Date Analyzed	Method/Reference	Concentration
Silver, recoverable (mg/L)	7/30/87	6010/1	<0.01
Arsenic, recoverable (mg/L)	8/12/87	7060/1	<0.01
Barium, recoverable (mg/L)	7/30/87	6010/1	0.2
Cadmium, recoverable (mg/L)	7/30/87	6010/1	<0.005
Chromium, recoverable (mg/L)	7/30/87	6010/1	0.031
Mercury, recoverable (mg/L)	7/28/87	7470/1	<0.0005
Lead, recoverable (mg/L)	8/11/87	6010/1	0.0072
Selenium, recoverable (mg/L)	8/14/87	7740/1	<0.01

Matrix:

Field Identification: 2332-302 Fort Totten Well #2
Laboratory Number: 10,465-6 Matrix:

t	Parameter	Date <u>Analyzed</u>	Method/Reference	Concentration
	Silver, recoverable (mg/L)	7/30/87	6010/1	<0.01
4	Arsenic, recoverable (mg/L)	8/12/87	7060/1	0.016
	Barium, recoverable (mg/L)	7/30/87	6010/1	0.23
	Cadmium, recoverable (mg/L)	7/30/87	6010/1	<0.005
7	Chromium, recoverable (mg/L)	7/30/87	6010/1	0.097
•	Mercury, recoverable (mg/L)	7/28/87	7470/1	<0.0005
	Lead, recoverable (mg/L)	8/11/87	6010/1	0.030
ı	Selenium, recoverable (mg/L)	8/14/87	7740/1	<0.01

Field Identification: 2332-303 Fort Totten Well #3

Laboratory Number: 10,465-9

•	Parameter	Date Analyzed	Method/Reference	Concentration
	Silver, recoverable (mg/L)	7/30/87	6010/1	<0.01
•	Arsenic, recoverable (mg/L)	8/12/87	7060/1	<0.01
	Barium, recoverable (mg/L)	7/30/87	6010/1	<0.1
	Cadmium, recoverable (mg/L)	7/30/87	6010/1	<0.005
•	Chromium, recoverable (mg/L)	7/30/87	6010/1	0.032
	Mercury, recoverable (mg/L)	7/28/87	7470/1	<0.0005
	Lead, recoverable (mg/L)	8/11/87	6010/1	0.0069
,	Selenium, recoverable (mg/L)	8/14/87	7740/1	<0.01

Field Identification: 2332-304 Fort Totten Well #4
Laboratory Number: 10,465-12 Matrix: Water

Parameter	Date Analyzed	Method/Reference	Concentration
Silver, recoverable (mg/L)	7/30/87	6010/1	<0.01
Arsenic, recoverable (mg/L)	8/12/87	7060/1	<0.01
Barium, recoverable (mg/L)	7/30/87	6010/1	0.15
Cadmium, recoverable (mg/L)	7/30/87	6010/1	<0.005
Chromium, recoverable (mg/L)	7/30/87	6010/1	0.072
Mercury, recoverable (mg/L)	7/28/87	7470/1	<0.0005
Lead, recoverable (mg/L)	8/11/87	6010/1	0.33
Selenium, recoverable (mg/L)	8/14/87	7740/1	<0.01

Field Identification: 2332-306 Fort Totten Well #6
Laboratory Number: 10,465-15 Matrix: Water

Parameter	Date Analyzed	Method/Reference	Concentration
Silver, recoverable (mg/L)	7/30/87	6010/1	<0.01
Arsenic, recoverable (mg/L)	8/12/87	7060/1	0.018
Barium, recoverable (mg/L)	7/30/87	6010/1	0.19
Cadmium, recoverable (mg/L)	7/30/87	6010/1	<0.005
Chromium, recoverable (mg/L)	7/30/87	6010/1	0.071
Mercury, recoverable (mg/L)	7/28/87	7470/1	<0.0005
Lead, recoverable (mg/L)	8/11/87	6010/1	0.016
Selenium, recoverable (mg/L)	8/14/87	7740/1	<0.01

Field Identification: 2332-308 Well Samp Blk Laboratory Number: 10,465-18 Matrix: Water

,	<u>Parameter</u>	Date <u>Analyzed</u>	Method/Reference	Concentration
	Silver, recoverable (mg/L)	7/30/87	6010/1	<0.01
	Arsenic, recoverable (mg/L)	8/12/87	7060/1	<0.01
	Barium, recoverable (mg/L)	7/30/87	6010/1	<0.1
	Cadmium, recoverable (mg/L)	7/30/87	6010/1	<0.005
	Chromium, recoverable (mg/L)	7/30/87	6010/1	<0.01
•	Mercury, recoverable (mg/L)	7/28/87	7470/1	<0.0005
	Lead, recoverable (mg/L)	8/11/87	6010/1	<0.005
	Selenium, recoverable (mg/L)	8/14/87	7740/1	<0.01

Field Identification: 2332-305 Fort Totten Well #5
Laboratory Number: 10,465-22

<u>Parameter</u>	Date Analyzed	Method/Reference	Concentration
Silver, recoverable (mg/L)	7/30/87	6010/1	<0.01
Arsenic, recoverable (mg/L)	8/12/87	7060/1	<0.01
Barium, recoverable (mg/L)	7/30/87	6010/1	<0.1
_Cadmium, recoverable (mg/L) .	7/30/87	6010/1	<0.005
Chromium, recoverable (mg/L)	7/30/87	6010/1	<0.025
Mercury, recoverable (mg/L)	7/28/87	7470/1	<0.0005
Lead, recoverable (mg/L)	8/11/87	6010/1	<0.005
Selenium, recoverable (mg/L)	8/14/87	7740/1	<0.01

References: 1) EPA SW 846, 2nd Edition

LABORATORY CONTROL SAMPLE

Lab Number: 10429

Site: Fort Totten

WS 378 CONC. 12 (DOUBLE CONC.)

	True Value	Found	% Recovery	Method
Silver	0.092	0.038	41	7760
Arsenic	0.124	0.123	99	7060
Barium	0.924	0.841	91	7080
Cadmium	0.0148	0.012	81	7130
Chromium	0.134	0.131	98	7190
Mercury	0.016	0.017	107	7470
Lead	0.126	0.117	93	7420
Selenium	0.0186	0.0161	87	7740

CALIBRATION VERIFICATION

Lab Number: 10429

Site: Fort Totten

Units: mg/L

HETALS:

	True Value	<u>Found</u>	<u>₹2</u>	Method
Arsenic	0.050	0.048	96	7060
Barium	20.0	20.0	100	7080
Cadmium	0.50	0.492	98	7130
Chromium	1.0	0.985	98.5	7190
Lead	10.0	10.0	100	7420
Mercury	0.0050	0.00515	103	7470
Selenium	0.050	0.049	99	7740
Silver	1.0	0.998	99.8	7760

¹⁾ Control Limits: Mercury and Tin 80-120; Other Metals 90-110

CALIBRATION VERIFICATION SOURCES

Dilution of Commercial AA Standard unless otherwise specified.

²⁾ Indicate Analytical Method Used: P-ICP; A-Flame AA; F-Furnace AA

QUALITY ASSURANCE/QUALITY CONTROL

MERCURY

10429-27 2332-328			,	1.89.	
Blank Number (ug/g)	1. Blank Data				
### Accuracy Coriginal Concentration (ug/g) Concentration (ug/g) Concentration (ug/g) Concentration (ug/g) Recove (ug/g) Recove (ug/g) Replicate 1 (ug/g) Replicate 2 Average (ug/g) Range (ug/g)	Blank Number		•		
2. Accuracy Sample Field I.D. 10429-27 2332-328 3. Precision Replicate 1 Replicate 2 Average Relative (ug/g) MB 366 Concentration (ug/g) NB 366 Concentration (ug/g) Concentration (ug/g) Recove (ug/g) Replicate 1 Replicate 2 Average Relative (ug/g) SILVER 1. Blank Data Blank Number (ug/g) MB 366 Concentration (ug/g) Concentration (ug/g) Silver Total Concentration (ug/g) Range Concentration (ug/g) Silver Total Concentration Found (ug/g) Concentration Found (ug/g) Recove (ug/g) Total Concentration Found (ug/g) Recove (ug/g) 10429-3 2332-326 Concentration Found (ug/g) Recove (ug/g)				•	
Coriginal concentration (ug/g) Spike Level (ug/g) Found (ug/g) Recovers	ngs og	(0.03		•	
3. Precision Sample Field I.D. (ug/g) (ug/g) (ug/g) (ug/g) Range	· · · · · · · · · · · · · · · · · · ·	Concentration		Concentration Found	% Recovery
Replicate 1 Replicate 2 Average Relative	10429-27 2332-328	0.207	1.0	1.23	102
Sample Field I.D. (lug/g) (lug/g) (lug/g) Range	3. Precision				*
SILVER S	Sample Field I.D.				Relative <u>Range</u>
1. Blank Data Results Blank Number (ug/g) MB 366 Co.5 2. Accuracy Original Concentration Spike Level Found (ug/g) 10429-3 2332-320 C1 7.2 7.0 97 10429-21 2332-326 C1 7.2 7.0 97 10429-21 2332-326 C1 Feeld I.D. Replicate 1 Replicate 2 Average Sample Field I.D. (ug/g) Replicate 1 Replicate 2 Average Concentration Concentration Found (ug/g) Recove (ug/g) Replicate 2 Average Relative (ug/g) 10429-3 2332-320 C1 C1 C1 NC	10429-27 2332-328	0.209	0.204	0.207	2.4
Results Blank Number (ug/g) MB 366	e e e e e e e e e e e e e e e e e e e		SILVER	•	
Blank Number (ug/g) MB 366 <0.5	1. Blank Data	Results		4/	
2. Accuracy Original Concentration Spike Level Found (ug/g) Recover 10429-3 2332-320 (1 7.2 7.0 97 10429-21 2332-326 (1 6.0 5.8 97 3. Precision Replicate 1 Replicate 2 Average Relative (ug/g) (ug/g) Range (ug/g) 10429-3 2332-320 (1 (1 NC)	Blank Number	-			
Original Concentration Sample Field I.D. (ug/g) (ug/g) Found (ug/g) Recove 10429-3 2332-320 <1 7.2 7.0 97 10429-21 2332-326 <1 6.0 5.8 97 3. Precision Replicate 1 Replicate 2 Average Relative Sample Field I.D. (ug/g) (ug/g) Range 10429-3 2332-320 <1 <1 <1 NC	MB 366	<0.5		4.	
10429-3 2332-320 <1 7.2 7.0 97 10429-21 2332-326 <1 6.0 5.8 97 3. Precision Replicate 1 Replicate 2 Average Relative (ug/g) (ug/g) Range 10429-3 2332-320 <1 <1 <1 NC	2. Accuracy	Concentration		Concentration Found	*
10429-21 2332-326 <1 6.0 5.8 97 3. Precision Replicate 1 Replicate 2 Average Relative (ug/g) (ug/g) Range (ug/g) 10429-3 2332-320 <1 <1 <1 NC	Sample Field I.D.	<u>(ua/a)</u>	<u>(ua/a)</u>	<u>(ua/a)</u>	Recovery
Replicate 1 Replicate 2 Average Relative Sample Field I.D. (ug/g) (ug/g) (ug/g) Range 10429-3 2332-320 <1 <1 <1 NC					7
Sample Field I.D. (ug/g) (ug/g) (ug/g) Range 10429-3 2332-320 <1	3. Precision				•
	Sample Field I.D.				Relative Range
·					

ARSENIC

		•			· '	
	1.	Blank Data				
		Blank Number	Results (ug/g)			
		MB 366	<1		As a g	
			, ·			
	2.	yccnrach	,		Total	
			Original	•	Concentration	a .
			Concentration	Spike Level	Found	*
	Sam	ole Field I.D.	(ug/g)	(ug/g)	(ug/g)	Recovery
•	104	29-3 2332-320	19	7.2	22.5	49
	104	29-21 2332-326	20	6.0	22.8	47
	з.	Precision		•		•
ı	J .	1100201011				*
		•	Replicate 1	Replicate 2	Average	Relative
,	Sam	ple Field I.D.	<u>(ug/g)</u>	<u>(ug/g)</u>	<u>(ug/g)</u>	Range
	104	29-3 2332-320	20	18	19	10.5
	104	29-21 2332-326	21	19	20	10
		·		BARIUM		
	•		•			
	1.	Blank Data				1. 1.
			Results	· ·		e.
		Blank Number	<u>(ug/g)</u>		**************************************	
		MB 366	<10			•
		MB 300	/#0			
	2.	Accuracy		u		
			Original	•	Total Concentration	n
		y	Concentration	Spike Level	Found	` %
	Sam	ole Field I.D.	<u>(ug/g)</u>	(ug/g)	(ug/g)	Recovery.
	104	29-3 2332-320	94	724	757	91
		29-21 2332-326	5	602	617	102
	3.	Precision				
		 				*
	_		Replicate 1	Replicate 2	Average	Relative
	Sam	ple Field I.D.	<u>(ug/g)</u>	(ug/g)	<u>(ug/g)</u>	Range
	104	29-3 2332-320	93	95	94	2
	104	29-21 2332 326	58	56	57	3.5
			·•	F - 4		

CADMIUM

1. Blank Data	Results			
Blank Number	<u>(ug/a)</u>	·		
MB 366	<0.5	•		
2. Accuracy			Total	
Sample Field I.D.	Original Concentration (ug/g)	Spike Level (ug/g)	Concentration Found (ug/g)	n % <u>Recovery</u>
10429-3 2332-320 10429-21 2332-326	0.72 <0.6	72 60.2	71 55	98 90
3. Precision		•		k
Sample Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
10429-3 2332-320 10429-21 2332-326	0.69 <0.6	0.7 4 <0.6	0.72 <0.6	6.9 NC
		CHROMIUM	t.	
 Blank Data Blank Number 	Results (ug/g)			
MB 366	<1		Tay.	
2. Accuracy		¥.		
	Original	Spike Level	Total Concentration Found	on %
Sample Field I.D.	Concentration (ug/g)	(ug/g)	(ug/g)	Recovery
10429-3 2332-320 10429-21 2332-326	39 27	725 602	796 640	104 102
3. Precision			·,	*
Sample Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
10429-3 2332-320 10429-21 2332-326	38 26	39 27	39 27	2.6 3.7

BARIUM

1. Blank Data	Results			
Blank Number	(mg/L)			
MB 367	<0.1	•	·	
2. Accuracy				
Sample Field T.D.	Original Concentration (mg/L)	Spike Level (mg/L)	Total Concentration Found (mg/L)	% Recovery
10465-3 2332-301	0.2	5.0	4.94	95
3. Precision	· ·			
Sample Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Relative Range
10465-3 2332-301	0.1	0.2	0.2	50
		CHROMIUM		
1. Blank Data		•		
Blank Number	Results (mg/L)		Sav.	
MB 367	<0.01			
2. Accuracy		* ************************************	Total	
Sample Field I.D.	Original Concentration (mg/L)	Spike Level	Concentration Found (mg/L)	% Recovery
10465-3 2332-301	0.031	5.0	5.4	107
3. Precision		e varieties de la company de		* * * * * *
Sample Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Relative Range
10465-3 2332-301	0.032	0.029	0.031	9.7
	i		•	

1. Blan	k Data	Results	· .	•	· :
<u>Blán</u>	k Number	(mg/L)			
мв з	167	<0.1			
2. Accu	racy		. ••.	Total	
Sample	Field I.D.	Original Concentration (mg/L)	Spike Level (mg/L)	Concentration Found (mg/L)	% Recovery
10465-3	2332-301	<0.1	5.0	4.97	99
		•••			
3. Pred	cision			•	*
Sample	Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Relative <u>Range</u>
10465-3		<0.1	<0.1	<0.1	NC
NC = no	t calculable	due to results	below detecti	on limit.	
			SELENIUM		
	nk Data	Results	***		
Blan	nk Number	(mg/L)			
MB	367	<0.01		¹ 44	
2. Acc	uracy			Total	
		Original Concentration	Spike Level	Concentration Found	*
Sample	Field I.D.	(mg/L)	(mg/L)	(mg/L)	Recovery
10465-3	2332-301	<0.01	0.05	0.0111	22
		·			
3. Pre	cision				*
<u>Sample</u>	Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Relative Range
10465-3	2332-301	<0.01	<0.01	<0.01	NC
	-			- 9 d m d d	

SILVER

	4	i i		
1. Blank Data	Results			
Blank Number	(mg/L)			
MB 367	<0.02			
0 Lagurage		• .		•
2. Accuracy			Total Concentration	
	Original Concentration	Spike Level	Found	* *
Sample Field I.D.	(mg/L)	(mg/L)	(mg/L)	Recovery
10465-3 2332-301	<0.01	0.05	0.053	106
3. Precision				
3. Precision			•	% Relative
Sample Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Range
10465-3 2332-301	<0.01	<0.01	<0.01	NC
in the control of the second		CADMIUM		
1. Blank Data	Results			
Blank Number	(mg/L)	•	•	
MB 367	<0.005		% ₹	*
2. Accuracy			Total	
	Original		Concentration	n.
	Concentration	Spike Level	Found	*
				Recovery
Sample Field I.D.	(mg/L)	(mg/L)	(mg/L)	
Sample Field I.D. 10465-3 2332-301		(mg/L) 0.5	(mg/L) 0.477	94
10465-3 2332-301	(mg/L)			
	(mg/L)			94
10465-3 2332-301	(mg/L)			94

SELENIUM

1.	Blank	Data	Results			
	Blank	Number	(ug/g)			
	MB 36	56	<1			· · · · · · · · · · · · · · · · · · ·
_	1			e e e e e e e e e e e e e e e e e e e		
2.	Accur ple	Field I.D.	Original Concentration (ug/g)	Spike Level (ug/g)	Total Concentration Found (ug/g)	% Recovery
	29-3 29-21	2332-320 2332-326	<1 <1	7.2 6.0	4.1	57 43
3.	Prec:	ision	• •	·		* *
Sam	ple	Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
	29-3 29-21	2332-320 2332-326	<1 <1	<1 <1	<1 <1	NC NC
NC	= No	t calculable	due to result	below detecti	on limit.	
NC			due to result		• • • • • • • • • • • • • • • • • • • •	
		t calculable k Data	Results		on limit.	
NC	Blan				• • • • • • • • • • • • • • • • • • • •	
NC	Blan	k Data k Number	Results		• • • • • • • • • • • • • • • • • • • •	
NC 1.	Blan	k Data <u>k Number</u> 66	Results <u>(ug/g)</u>		• • • • • • • • • • • • • • • • • • • •	n <u>k</u> <u>Recovery</u>
NC 1. 2. Saπ 104	Bland Bland MB 3 Accu	k Data <u>k Number</u> 66 racy	Results (ug/g) <1 Original Concentration	<u>LEAD</u> Spike Level	Total Concentration Found	% .
NC 1. 2. Saπ 104	Bland MB 3 Accumple 129-3 129-21	k Data k Number 66 racy Field I.D. 2332-320	Results (ug/g) <1 Original Concentration (ug/g) 40	LEAD Spike Level (ug/g) 724	Total Concentration Found (ug/g) 684	Recovery 89 89
NC 1. 2. Sam 104 104 3.	Bland MB 3 Accumple 129-3 129-21	k Data k Number 66 racy Field I.D. 2332-320 2332-326	Results (ug/g) <1 Original Concentration (ug/g) 40	LEAD Spike Level (ug/g) 724	Total Concentration Found (ug/g) 684	Recovery 89

ARSENIC

					•
1. Blank Dat	8	Results			
Blank Num	ber	(mg/L)	•		
MB 367		<0.01			
2. Accuracy			`		
		outstal		Total Concentration	
	-	Original Concentration	Spike Level	Found	*
Sample Fiel	d I.D.	(mg/L)	(mg/L)	(mg/L)	Recovery
10465-3 233	2-301	<0.1	0.05	0.0427	85
	•				4
3. Precision	,				. •
		Replicate 1	Replicate 2	Average	Relative
Sample Fiel	d I.D.	(mg/L)	(mg/L)	(mg/L)	Range
10465-3 233	2-301	<0.01	<0.01	<0.01	NC
NC = Not calc	ulable d	ue to result l	pelow detection	n limit.	•
			MERCURY		. ·
				·	,
1. Blank Dat	.	Results		e Sav	
Blank Num	ber	(mg/L)		**	
MB 367		<0.0005			
2. Accuracy			· · · · · · · · · · · · · · · · · · ·	*	•
			•	Total	*
		Original	Oribe Issuel	Concentration Found	n
Sample Fiel	d I.D.	Concentration (mg/L)	Spike Level (mg/L)	(mg/L)	Recovery
				*	
10465-3 233	2-301	<0.0005	0.01	0.00755	76
3. Precision				•	*
Sample Fiel	d I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Relative Range
10465-3 233	2-301	<0.0005	<0.0005	<0.0005	NC
NC = Not calc	ulated d	ue to result !	below detectio	n limit.	

Lab Number:

Sample Designation: Date Analyzed:

Matrix:

STD 50 PPB (run as a sample)

C3841

8/3/87 Soil

VOLATILE ORGANICS	CONC. OF STANDARD	CONC. FOUND	% RECOVERY	DETECTION LIMIT
	(na\a)	(ug/g)	RECOVERT	(ug/g)
	(ug/g/	(ug/g/	0.0	1.0
CHLOROMETHANE	6.2		0.0	1.0
VINYL CHLORIDE		6.8	109.7	0.5
CHLOROETHANE	6.2	*	0.0	0.5
BROMOMETHANE	6.2	3.7	59.7	0.5
METHYLENE CHLORIDE	6.2		93.5	0.5
1,1-DICHLOROETHYLENE	6.2	5.8	88.7	0.5
1,1-DICHLOROETHANE	6.2	5.5		0.5
1,2-trans-DICHLOROETHYLENE	6.2	5.9	95.2	-
CHLOROFORM	6.2	5.6	90.3	0.5
1,2-DICHLOROETHANE	6.2	6.0	96.8	0,5
1,1,1-TRICHLOROETHANE	6.2	5.6	90.3	0.5
CARBON TETRACHLORIDE	6.2	5.7	91.9	0.5
BROMODICHLOROMETHANE	6.2	6.1	98.4	0.5
1,2-DICHLOROPROPANE	6.2	6.1	98.4	0.5
1,3-trans-DICHLOROPROPENE	4.8	6.2	129.2	0.5
TRICHLOROETHYLENE	6.2	6.2	100.0	0.5
BENZENE	6.2	6.1	98.4	0.5
1,3-cis-DICHLOROPROPENE	7.8	6.1	78.2	0.5
1,1,2-TRICHLOROETHANE	6.2	6.7	108.1	0.5
2-CHLOROETHYL VINYL ETHER	6.2	6.2	100.0	0.5
DIBROMOCHLOROMETHANE	6.2	6.5	104.8	0.5
BROMOFORM	6.2	6.5	104.8	0.5
TETRACHLOROETHYLENE	6.2	6.4	103.2	0.5
1,1,2,2-TETRACHLOROETHANE	6.2	6.6	106.5	0.5
TOLUENE	6.2	6.6	106.5	0.5
CHLOROBENZENE	6.2	6.1	98.4	0.5
ETHYLBENZENE	6.2	5.9	95.2	0.5
ACETONE	6.2	5.7	91.9	2.5
CARBON DISULFIDE	6.2	5.9	95.2	0.5
THF	6.2	6.2	100.0	2.5
MEK	6.2	6.6	106.5	2.5
VINYL ACETATE	6.2	5.6	90.3	1.0
MIBK	6.2	5.6	90.3	2.5
2-HEXANONE	6.2	6.0	96.8	2.5
STYRENE	6.2	6.1	98.4	0.5
XYLENES	17.0	16.0	94.1	0.5

^{*} The retention times have changed and Chloromethane eluted before scan start delay began. Vinylchloride and Bromomethane's baseline detection is poor due to new column bleed.

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: EPA SW 846, 2ND EDITION

METHOD 8240

Lab Number: Sample Designation: Date Analyzed: Matrix:

WP017C1 HALO C3823 8/3/87 Water

VOLATILE ORGANICS	TRUE	CONC.	DETECTION	*
	VALUE	FOUND	LIMIT	RECOVERY
	(ug/L)	(ug/L)	(úg/L)	
CHLOROMETHANE	BDL	BDL	10	, .
VINYL CHLORIDE	BDL	BDL	10	·
CHLOROETHANE	BDL	BDL	5	
BROMOMETHANE	BDL	BDL	. 5	
METHYLENE CHLORIDE	98.0	65.9	["] 5	67
1,1-DICHLOROETHYLENE	BDL	BDL	5	•
1.1-DICHLOROETHANE	BDL	BDL	5 5	. •
1,2-trans-DICHLOROETHYLENE	BDL	BDL	5	•
CHLOROFORM	60.4	39.3	5	65
1,2-DICHLOROETHANE	90.2	85.0	. 5	94
1,1,1-TRICHLOROETHANE	73.8	25.4	5	34
CARBON TETRACHLORIDE	92.7	22.8	5	24
BROMODICHLOROMETHANE	84.5	77.7	5 5 5	92
1,2-DICHLOROPROPANE	BDL	BDL	5	
1,3-trans-DICHLOROPROPENE	BDL	BDL	5	
TRICHLOROETHYLENE	55.1	22.3	5	40
BENZENE	BDL	BDL	5	
1.3-cis-DICHLOROPROPENE	BDL	BDL	5 5 5	
1,1,2-TRICHLOROETHANE	BDL	BDL	5	
2-CHLOROETHYL VINYL ETHER	BDL	BDL	5	•
DIBROMOCHLOROMETHANE	71.7	89.0	5	124
BROMOFORM	97.8	122	5	125
TETRACHLOROETHYLENE	48.0	19.0	5	39
1,1,2,2-TETRACHLOROETHANE	BDL	BDL	5	
TOLUENE	BDL	BDL	` 5	
CHLOROBENZENE	79.1	55.6	5	70
ETHYLBENZENE	BDL	BDL	- 5	•
			_	
ACETONE	BDL	BDL	25	•
CARBON DISULFIDE	BDL	BDL	5	•
THF	BDL	BDL	25	
MEK	BDL	BDL	25	
VINYL ACETATE	BDL	BDL	10	
MIBK	BDL *-	BDL	25	ar,¶ar
2-HEXANONE	BDL	BDL	25	
STYRENE	BDL	BDL	5	
XYLENES	BDL	BDL	5	• •
•••			-	•

SURROGATE STANDARDS RECOVERY

	RECOVERY (%)	ACCEPTANCE LIMITS (%)
d4-DICHLOROETHANE	100	70 - 121
d8-TOLUENE	106	81 - 117
BROMOFLUOROBENZENE	102	74 - 121

Lab Number: Blank
Sample Designation: C3816
Date Analyzed: 8/3/87
Matrix: Water

VOLATILE ORGANICS	CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
CHLOROMETHANE	BDL	10
VINYL CHLORIDE	BDL	10
CHLOROETHANE	BDL	5
BROMOMETHANE	BDL	Š
METHYLENE CHLORIDE	3	, , , , , , , , , , , , , , , , , , ,
1,1-DICHLOROETHYLENE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,2-trans-DICHLOROETHYLENE	BDL	Š
CHLOROFORM	BDL	· 5
1,2-DICHLOROETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5
CARBON TETRACHLORIDE	BDL	5
BROMODICHLOROMETHANE	BDL	5
	* '	
1,2-DICHLOROPROPANE	BDL	·* 5
1,3-trans-DICHLOROPROPENE	BDL	5
TRICHLOROETHYLENE	BDL	5
BENZENE	BDL	5
1,3-cis-DICHLOROPROPENE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
2-CHLOROETHYL VINYL ETHER	BDL	5
DIBROMOCHLOROMETHANE	BDL	5
BROMOFORM	BDL	5
TETRACHLOROETHYLENE	BDL	5
1,1,2,2-TETRACHLOROETHANE	BDL	√, 5
TOLUENE	1.6	5
CHLOROBENZENE	BDL	5
ETHYLBENZENE	BDL	. 5
ACETONE	BDL	, [*] 25
CARBON DISULFIDE	BDL	5
THF	BDL	25
MEK	BDL	25
VINYL ACETATE	BDL	10
MIBK	BDL	25
2-HEXANONE	BDL	25
STYRENE	BDL	5
XYLENES	BDL	5
SURROGATE STANDARDS RECOVERY		
	RECOVERY	ACCEPTANCE LIMITS
	(%)	(%)
d4-DICHLOROETHANE	90	76 - 114
		· · · · · · · · · · · · · · · · · · ·

102

BDL = BELOW DETECTION LIMIT

d8-TOLUENE

BROMOFLUOROBENZENE

METHOD REFERENCE: EPA SW 846, 2ND EDITION METHOD 8240

88 - 110 86 - 115 Lab Number:

MeOH Blank 7/29

Sample Designation: Date Analyzed: Matrix:

C3839 8/3/87

Solid

	•	
VOLATILE ORGANICS	CONCENTRATION	
	(ug/g)	(ug/g)
CHLOROMETHANE	BDL	1
VINYL CHLORIDE	BDL	1
CHLOROETHANE -	BDL	0.5
BROMOMETHANE	BDL	. 1
METHYLENE CHLORIDE	1.4	0.5
1,1-DICHLOROETHYLENE	· BDL	0.5
1,1-DICHLOROETHYLENE 1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE		0.5
	BDL	0.5
	BDL BDI	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE	BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE		0.5
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	- 0.5
DIBROMOCHLOROMETHANE	BDL	0.5
BROMOFORM	BDL	0.5
TETRACHLOROETHYLENE	BDL	0.5
1,1,2,2-TETRACHLOROETHANE	BDL	0.5
TOLUENE	1.0	0.5
CHLOROBENZENE	BDL	-0.5
ETHYLBENZENE	BDL	0.5
	DD D	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBK	BDL	2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
SURROGATE STANDARDS RECOVER	XY	
	RECOVERY	ACCEPTANCE LIMITS
	(%)	(%)
d4-dichloroethane	83	70 - 121
d8-Toluene	98	81 - 117
BROMOFLUOROBENZENE	96	74 - 121
• Communication of the communi		

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: EPA SW 846, 2ND EDITION

METHOD 8240

Lab Number: 10,429-1
Sample Designation: 2332-320 Fort Totten Soil #1
Date Analyzed: 8/3/87
Matrix: Solid

VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
	(ug/g)	(ug/g)
CHLOROMETHANE	BDL	. 1
VINYL CHLORIDE	BDL	1
CHLOROETHANE -	BDL	0.5
BROMOMETHANE METHYLENE CHLORIDE	· BDL	1
METHYLENE CHLORIDE	BDL	0.5
1,1-DICHLOROETHYLENE	BDL	0.5
1,1-DICHLOROETHYLENE 1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE	BDL	0.5
CHLOROFORM	BDL	0.5
1,2-DICHLOROETHANE	BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE	BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	0.5
DIBROMOCHLOROMETHANE	BDL	A =
BROMOFORM	BDL	, 0.5 0.5
TETRACHLOROETHYLENE	BDL	0.5
•	BDL	0.5
TOLUENE	BDL	0.5
CHLOROBENZENE	BDL	0.5
ETHYLBENZENE	BDL	0.5
		•••
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBK	BDL	2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
SURROGATE STANDARDS RECOVERY		
	RECOVERY (%)	ACCEPTANCE LIMITS (%)
d4-DICHLOROETHANE	90	70 - 121
d8-TOLUENE	111	81 - 117
BROMOEI HORORENGENE	100	74 404

102

BDL = BELOW DETECTION LIMIT

BROMOFLUOROBENZENE

METHOD REFERENCE: EPA SW 846, 2ND EDITION

METHOD 8240

ACID/BASE/NEUTRAL MATRIX SPIKE RECOVERY

Laboratory Number: Sample Designation:

10,429-2

2332-320 Fort Totten Soil #1

Date Analyzed:

8/12/87

Matrix:

Solid

COMPOUND	SAMPLE CONC. (ug/g)	CONC. SPIKE ADDED (ug/g)	CONC. SPIKE FOUND (ug/g)	& RECOVERY
1,4-DICHLOROBENZENE	0	3.3	0.3	9.090
ACENAPTHENE	0	3.3	2	60.60
2,4-DINITROTOLUENE	Ó	3.2	2.4	75
N-NITROSO-DI-N PROPYLAMINE	0	3.5	2.3	65.71
PYRENE	0	3.5	1.8	51.42
PHENOL	Ō	6.8	3.1	45.58
2-CHLOROPHENOL	Ŏ	9.5	3.4	35.78
4-CL-3-METHYLPHENOL	Ŏ,	6.7	8.4	125.3
4-NITROPHENOL	Ŏ	6.7	1 7	
PENTACHLOROPHENOL	Ŏ	6.5	4.3	25 66

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: EPA SW 846, 2ND EDITION

METHOD 3550/8270

Lab Number: Sample Designation: Date Analyzed:

Matrix:

10,429-4 2332-321 Fort Totten Soil #2 8/3/87 Solid

	•		
	VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
		(ug/g)	(ug/g)
	CHLOROMETHANE	BDL	1
	VINYL CHLORIDE	BDL	1
	CHLOROETHANE -	BDL	0.5
	BROMOMETHANE	BDL	1
	METHYLENE CHLORIDE	BDL	0.5
ı	1,1-DICHLOROETHYLENE	. BDL	0.5
	1,1-DICHLOROETHANE	BDL	0.5
	1,2-trans-DICHLOROETHYLENE	BDL	0.5
١.	CHLOROFORM	BDL	0.5
	 	BDL	0.5
	1,2-DICHLOROETHANE	BDL	0.5
	1,1,1-TRICHLOROETHANE	BDL	0.5
	CARBON TETRACHLORIDE	BDL	0.5
	BROMODICHLOROMETHANE	BDL	0.5
	1,2-DICHLOROPROPANE		0.5
	1,3-trans-DICHLOROPROPENE	BDL	0.5
	TRICHLOROETHYLENE	BDL	0.5
	BENZENE	BDL	
	1,3-cis-DICHLOROPROPENE	BDL	0.5
	1,1,2-TRICHLOROETHANE	BDL	0.5
	2-CHLOROETHYL VINYL ETHER	BDL	0.5
	DIBROMOCHLOROMETHANE	BDL	0.5
	BROMOFORM	BDL	0.5
	TETRACHLOROETHYLENE	BDL	0.5
	1,1,2,2-TETRACHLOROETHANE	BDL	0.5
	TOLUENE	BDL	0.5
	CHLOROBENZENE	BDL	_0.5
	ETHYLBENZENE	BDL	0.5
		•	
	ACETONE	BDL	2.5
	CARBON DISULFIDE	BDL	0.5
	THE	BDL	2.5
	MEK	BDL	2.5
	VINYL ACETATE	BDL	1
	MIBK	BDL	2.5
	2-HEXANONE	BDL	2.5
ì	STYRENE	BDL	0.5
	XYLENES	BDL	0.5
	VITENDS		
	SURROGATE STANDARDS RECOVERY		
	SOURCOATE STANDARDS RECOVERT	RECOVERY	ACCEPTANCE LIMITS
		(%)	(%)
		90	70 - 121
	d4-DICHLOROETHANE	101	91 - 117

101

101

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: EPA SW 846, 2ND EDITION
METHOD 8240

d8-TOLUENE

BROMOFLUOROBENZENE

Resource Analysts, Incorporated

81 - 117

ACID/BASE/NEUTRAL EXTRACTABLE TREAMSC COMPOUNDS

Laboratory Number: 10.429-5
Sample Designation: 2332-321 Fort Totten Soil #2
Date Extracted: 7/30/57
Date Analyzed: 5/3/27
Testrix: Soil

Results expressed on a dry (193 degrees C) basis.
Moisture Content: 9.74

FLUORENE

=		CONCENTRATION (ug/s)	DETECTION LIMIT	A	CONCENTRATIO	N DETECTION (IM. Tugʻal
•	N-NITROSODIMETHYLAMINE	BDL	0.8	4-MITFOANTLINE	891	1
	FHENOL .	BOL	6.3	4.6-DINITRO 2-METHYLPHENCL	8 51.	1
	Bis (2-CHLOROETHYL ETHER)	- BDL	0.3	N-NITROSODIPHENYLAMINE (1)	BOL	9.0
ſ	2-CHLORGPHENOL	BOL	0.3	4-BROMOPHENYL-PHENYLETHER	SDL	9.3
	1.3-DICHLOROBENZENE	SDL	0.3	HEXACHLOROBENZENE	BDL	9.3
	1:4-DICHLOROBENZENE	BDL	0.2	PENTACHLOROPHENOL	851	• •
!	EENZYL ALCOHOL	301	0.3	FHENANTHRENE	501	ē. š
	1.2-DICHLOROBENZENE	BDL	6.3	ANTHRACENE	801	0.3
	2-METHYLFHENDL	BOL	0.3	DI-N-BUTYLFHTHALATE	BDL	0.3
1	Bis 12-CHLORDISCERGENT ETHER	BDL	9.3	FLUGROANTHENE	2	0.3
•	4-METHYLPHENOL	BOL	0.3	BENZIDENE	30F	2
	HEYACHLORGETHANE	5 9.	0.3	PYRENE	1.7	0.3
	N-NITROSODI-N-PROFYLAMINE		0.3	EUTYLBENCYLPHTHALATE	501	8 3
7	ATTRUSEAZEAE	501	G. 3	1.3'-DICHLORGBENZIDINE	891	8.5
	ISOFHORONE	£01	6.3	EENZGI # FANTHRACENE	1.3	5.3
	-2-NITROFHENDL	BOL	6 3	CHRYSENE	1	1.3
ŧ	2.4-DIMETHYLPHENGL	EDL	0.3	BES 2-ETHYLHEXYL IPHTHALATE	2.7	2.3
	SENZOIC ACID	8D'.	1	DI-N-OCTYLPHTHALATE	BDL	0.3
	Els (2-CHLORETHOXY) METHANE	EDL	0.3	BENZOID FLUGRANTHENE	2.1	0.3
•	2.4-DICHLOROFHENOL	801	6.3	BENZOIK!FLUORANTHEAE	80.	0.3
	1,2,4-TRICHLOROBENZENE	BDL	6.3	EENZO(& IPYRENE	1.4	0.3
	NAPHTHALENE	BDL	0.3	IDENOI1.2.3-c.d)PYFENE	0.6	2.3
	6-CHEGRGANTEINE	BDL	0.3	DIBENZO(a.h)ANTHRACENE	EÐL	.0.3
ŧ	HEXACHLOROBUTADIENE	BDL	0.3	BENZO(g.h.i)PERYLENE	0.7	6.8
	4-CHLORO-3-METHYLFHENG	BDL	0.3			
	2-METHYLNAPHTHALENE	BOL	0.3	SURROGATE STANDARDS RECOVERY		
,	MEXACHLOROCYCLOPENTADIENE	BDL	0.3		RECOVERY	ACCEPTANCE LIMI
,	1.4.5-TRICH_OROPHENE_	BUL	·· 0.3		(\$)	(%)
	2.4.5-TRICHLOROFMENOL	BDL	1	2-FL-PHENOL	14	21 - 100
_	2-CHLORONAPHIMALENE	30L	0.3	de-PHENOL	15	10 - 94
Ÿ	2-NITROANILINE	BOL	1	NITROBENZENE-d5	19	35 - 114
	DIMETHYLPHTHALATE	80L	0.3	2-FL-BIPHENYL	27	43 - 115
	ACENAPHEHYLENE	BOL	9.3	TRIBROMOPHENGL	29	. 10 - 111
	1.6-DINITRATOLUEME	BÚL	0.3	TERPHENYL-014	45	33 - 161
	3-NITROANILINE	801	1	1511115 624	•	90 - 10.
	ACENAPHTHENE	BDL	0.3			•
	2.4-DINITROPHENOL	BOL	1	•		
•	4-NITROPHENCE	BDL	•	,		
	DIBENZOFURAN	BDL	0.3	1		
	2.4-DINITROTOLUENE	BOL	0.3	\mathcal{U}	15 A	
٠	DIETHYLPHTHALATE	BDL	0.3	BOL = BELOW DETECTION LIMIT	•	
	4-CHLOROPHENYL-PHENYLETHER	BDL	0.3		ÙR ERTTIAN	•
	SI HADENE	900	U. 3	METHOD REFERENCE: EPA SW 866. 2	ND FOILINK	

BDL

Resource Analysts, Incorporated

METHOD 3550/8279

Lab Number: 10,429-7
Sample Designation: 2332-322 Fort Totten Soil #3
Date Analyzed: 8/3/87
Matrix: Solid

		4		
	VOLATILE ORGANICS	CONCENTRATION	DETECTION LIM	TT
		(ug/g)	(ug/g)	-
	CHLOROMETHANE	BDL	1	
	VINYL CHLORIDE	BDL	ī	
	CHLOROETHANE	BDL	0.5	
	BROMOMETHANE	BDL	1	
	METHYLENE CHLORIDE	BDL	0.5	
	1,1-DICHLOROETHYLENE	BDL	0.5	
	1,1-DICHLOROETHANE	BDL	0.5	
	1,2-trans-DICHLOROETHYLENE	BDL	0.5	
٠.	CHLOROFORM	BDL	0.5	
	1,2-DICHLOROETHANE	;BDL	0.5	
	1,1,1-TRICHLOROETHANE	BDL	0.5	
	CARBON TETRACHLORIDE	BDL	0.5	
	BROMODICHLOROMETHANE	BDL	0.5	
	1,2-DICHLOROPROPANE	BDF		
	1,3-trans-DICHLOROPROPENE	BDL	0.5	
	TRICHLOROETHYLENE	BDL	0.5	
	BENZENE	BDL	0.5	
		BDL	0.5	
	1,3-cis-dichloropropene 1,1,2-trichloroethane	BDL	0.5	
	2-CHLOROETHYL VINYL ETHER		0.5	
	DIBROMOCHLOROMETHANE	BDL	0.5	
	BROMOFORM	BDL	0.5	
	TETRACHLOROETHYLENE	BDL	0.5	
	1,1,2,2-TETRACHLOROETHANE	BDL	0.5	
	TOLUENE	BDL	0.5	
	CHLOROBENZENE	BDL	0.5	-
	ETHYLBENZENE	BDL	-0.5	
	EIRILBENZENE	BDL	0.5	
	ACETONE	BDL	2.5	
	CARBON DISULFIDE	BDL	0.5	
•	THF	BDL	2.5	
	MEK	BDL	2.5	
	VINYL ACETATE	BDL	2.5	٠.
	MIBK	BDL	2.5	
	2-HEXANONE	BDL	2.5	
	STYRENE	BDL	0.5	
	XYLENES	BDL	and the second s	•
		804	0.5	
	SURROGATE STANDARDS RECOVERY		S 4	
		RECOVERY	ACCEPTANCE LIMITS	
		(%)	(%)	
	d4-DICHLOROETHANE	66	70 - 121	,

•	RECOVERY	ACCEPTANCE LIMITS
••	(%)	(%)
d4-DICHLOROETHANE	6 6	70 - 121
d8-TOLUENE	90	81 - 117
BROMOFLUOROBENZENE	76	74 - 121

19.429-8

2332-322 Fort fatten Soil #3 Saiple Designation:

7/3:/:7 late Extrected: 9/8/97 Date Analyzed: Sail

Results expressed on a dry (103 degrees C) basis, Moisture Content: 15.54

• •					
	CONCENTRATION	DETECTION LIMIT	•	CONCENTRATION	DETERMINATION OF
	(ug/ç)	(up/g)		(9\$/\$)	lug/gr
/ N-NITROSODIMETHYLAMINE	<u>201</u>	0.5	4-NITROANILINE	[′] 8∂L	•
PHENOL	BDL	£.3	4.6-DINITRG-3-METHYLFHENDL	8%L	:
Eis 12-CHLOROETHYL ETHER	BOL	6.3	N-NITROSODIFHENYLAMINE (1)	ED:	0,3
2-CHLOROPHENOL	BDL	0.3	4-BROMOPHENYL-PHENYLETHER	E91	9.3
1 1.3-DICHLOROSENZENE	SOL	0.3	HEXACHLORGBENZENE	EDL	Q. Z
1.4-DICHLOROBENZENE	201	0.3	PENTACHLOROPHENOL	5 21	•
BENZYL ALCOHOL	301	0.3	PHENANTHRENE	ECL	9.3
f 1.2-DICHLOROBENZEAE	801	2.3	ANTHRACERE	2 0'_	0.1
2-METHYLPHENOL	EOL	9.3	DI-N-BUTYLEHTHALATE	30L	0.3
Bis 11-CHLOROISOPFOFILE ETHER	BOL	0.3	FL WORDANTHENE	Trace	2.5
ALMATHY: BREND:	BOL	6.3	EENZIDENE	EUL	2
HEXACHLOPDETMANE	BOL	0.3	PYPENE	Trace	2.1
» N-ALTROSODI-A-FROFYLAMINE	201	6.3	BUTYLEEMZYLEMTHALATE	£0L	0.7
nite Ferzeni	801	2.3	3.3'-bichlososenzibinš	601	€.7
1 1:09#09045	ED1	ŭ. :	EENZT ATANTHRACENE	89L	5.3
1-NITROPHENOL	BOL	9.3	CHRYSENE	801	2.3
1.1-BIMETHYLFMENDL	EDL	0.3	Bisio-Einylnexyllehthalate	1.5	¢.:
# HENZOIC ACID	ā0_	1	DI-N-OCTALPHTHALATE	6 00	1.3
ELS 12-CHLOFETHOXY) METHANE	20 L	0.3	BENZO'S (FLUORANTHENE	ĒDL	9, 2
2.4-DICHLOROPHENCL	801	0.3	SENZGER PREBORANTHENE	801	3. 2
1.2.4-TRICHLOROBENZENE	EDL	0.3	EENZO(a) FYRENE	80L	0.3
NAPHTHALENE	20L	0.3	IDENC(1.2.3-c.d)# KRENE	ENL	0.3
4-CHLORGANILINE	EDL	0.3	DIBENZO(a.h)ANTHRACENE +	EÐL	5,3
HE/ACHLOROBUTADIENE	BDL	ũ.3	BENZO(g.h.i) FERYLENE	EDL	
t 4-Caloro-3-METHYLFHENOL	EDL	0.3			
2-METHYLNAPHTHALENE	801	0.3.	SURROGATE STANDARDS RECOVERY		,
HEXACHLOROCYCLOPENTAGIENE	30L	9.3		RECOVERY	ACCEPTANCE LIMI
2.4.5-TRICHLOROPHENOL	5 1.1	0.3	entre de la companya del companya del companya de la companya de	(4)	(\$1
1.4.5-TRICHLOFOFHENOL	501	1	2-FL-PHENOL	7 19 19 19 19 19 19 19 19 19 19 19 19 19	21 - 190
2-CHLORONAPHTHALENE	801	G, 3	ob-Phenol	32	10 - 90
2-NITROANILINE	BDL	1	NITROBENZENE-d5	17	35 - 11-
DEMETRYLPHINALATE	801	0.3	2-FL-BIPHENYL	2.	43 - 11:
acenaphthylene	₹JL	0.3	TRIEROMOFHENOL	. ເປັ	18 - 121
2.:-DINITROTOLUENE	BOL	0.3	TERPHENYL-C14	73	35 - 141
I-NITROANILINE	EDL	1			
ACENAPHTHENE	BOL	0.3		•	
2.4-DINITROPHENOL	BDL	1	"Trace" denotes probable presence	below listed c	etection limit.
4-NITROPHENOL	BDL	1			
DIBENZOFURAN	BDL	0.3			
2.4-DINITROTOLUENE	BUL	Ĉ.J			
-DIETHYLFHTHALATE	BOL	0.3	/ BOL = BELOW DETECTION LIMIT		
4-CHLOROPHENYL-PHENYLETHER	BDL	0.3	$-\int_{\mathcal{C}}$ Michod Reference: EPA SN 546, 28	ID EDITION	
FLUORENE	BDL	0.3	METHOD 3550/82		•

Lab Number:

Sample Designation:

Date Analyzed:

10,429-10

2332-323 Fort Totten Soil #4

Matrix:

Solid

VOLATILE ORGANICS	CONCENTRATION (ug/g)	DETECTION LIMIT (ug/g)
CHLOROMETHANE	(ug/g) BDL	1
VINYL CHLORIDE	BDL	1
CHLOROETHANE -	BDL	0.5
BROMOMETHANE	BDL	. 1
METHYLENE CHLORIDE	BDL	0.5
1,1-DICHLOROETHYLENE	BDL	0.5
1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE		0.5
CHLOROFORM	BDL	0.5
1.2-DICHLOROETHANE	BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE	BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER		0.5
DIBROMOCHLOROMETHANE	BDL	0.5
BROMOFORM	BDL	و.0.5
TETRACHLOROETHYLENE	BDL	0.5
1,1,2,2-TETRACHLOROETHANE		0.5
TOLUENE	BDL	0.5
CHLOROBENZENE	BDL	0.5
ETHYLBENZENE	BDL	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBK	BDL	2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
SURROGATE STANDARDS RECOV		
	RECOVERY (%)	ACCEPTANCE LIMITS (%)
	4.4.4	80 404

100

105

103

BDL = BELOW DETECTION LIMIT

d4-DICHLOROETHANE

BROMOFLUOROBENZENE

d8-TOLUENE

EPA SW 846, 2ND EDITION METHOD REFERENCE:

METHOD 8240

Resource Analysts, Incorporated

70 - 121 81 - 117

74 - 121

ACID/BASE/NEUTRAL EXTRACTMELE GROWNED COMPOUNDS

.appretory Number:

10,429-11

Sample Designation

2332-323 Fort Totten Soil #4

ete Extrectéo:

7/30/57

ate Analyzed:

8/3/27

-2.--.

Soil

isults expressed on a dry (100 degrees C) basis.

	CONCENTRATION	DETECTION LIMIT		CONCENTRATION	DETECTION LIMIT
-	(ug/q)	(ug/ç)		(ug/g)	luş/ş
N-NITROSODIMETHYLAMINE	EDL	0.8	H-ACTROANTLINE	30L	1
* HENDL	801	0.3	4.5-DIKTIR(-2-METHYLFHÉNOL	BDL	1
is (2-CHLOROETHYL ETHER)	BDL	0.3	N-KETRESODIFHENYLAMINE (1)	EDL	0.2
2-CHLOROPHENOL	BD1	0.3	4-ETOMOTHENYL-PHENYLETHER	BOL	C. 3
. 1.3-DICHLOROBENZENE	BDL	9.3	- HERACHL DEDBENZENE	8 0L	0.3
.4-DICHLOROBENZENE	BOL	0.3	FENT ACHL DEOPHENOL	B0'.	1
ENZYL ALCOHOL	EDL	0.3	THE WANTERE	5 01	0.3
1.2-SICHLOROBENZENE	<u>801</u>	0.3	ANTHRACENE	201	0.3
-netrylphenol	2ÓL	6.3	DI-N-BUTYLFHT-ALATE	301	r. T
is 12-CHLORDISOPROPYL' ETHER	BDL .	0.3	TLUGROANTHENE	BOL	0.3
4-METHYLPHENOL	BDL	0.3	BENZIDENE	BOL	2
/ EXACH_ORGETHANE	BĎĹ	0.3	PYRENE	801	0.3
I-NITROSODI-N-FROPYLAMINE	50L	0.3	BUTTLEENZYLEHTHALATE	EDL	0.3
RITROBENZENE	891	0.3	J.C'-DICHLDROEENZIDINE	BDL	ů. 7
*SOPHORONE	801	0.3	HENTO HE LANTHRACENE	SDL	0.3
-AITAOFHENOL	EDL	0.3	GHRYSENE	BOL	5.0
4-DIMETHYLFHENOL	EDL	0.3	BIGG CHETHYLHEXYL JEHTHALATE	1.4	0.3
EENZGIC ACID	BDL	1	OU-W-DICTMLFHIHALATE	801	0.3
is (2-CHLORETHOXY) METHANE	BDL	0.3	BENEEDLE) FLUORANTHENE	Trace	1.1
. 6-DICHLOROPHENOL	60L	0.3	SENSOFK FEDDRANTHENE	6 01	- 0.3
1.2.4-TRICHLORDENZEME	EDL	0.3	ERICO'S FYREHE	BOL	6.3
/ MATHITHALENE	BOL	0.3	ICERCIC Z. Z-c. difyrene	BOL	9,3
CHLORDANILINE	BDL .	.i. 6, 3	TYPERENTO IB. HI ANTHRACENE	€DL	0.3 .
MEXACHLOROBUTADIENE	BD!	9.3	PENEMORAN, 1 PER LENE	Bül	0.3
4-CHLORG-3-METHYLPHENGL	EDL	0.3			
-RETHYLNAPHTHALENE	EDL	9.3	PROPROGATE STANDARDS RECOVERY		*
HEXACHLOROCYCLOPENTADIENE	_ BDL	6.3		RECOVERY	ACCEPTANCE LIMITE
2.4.6-TRICHLOROPHENOL	BDL	0.3		(%)	(\$:
* 2.4.5-TRICHLOROPHENOL	3DL	1	2-11-PHENGL	34	21 - 100
CHLORONAPHTHALENE	EDL	0.3	OF THE NOT	45	10 - 44
2-NITFOANILINE	BDL	1 "	N! TROBENZENE-15	43	35 - 114
→ DIMETHYLPHTHALATÉ	801	G. 3	2-FL-EIFHENYL	52	43 - 11t
*CENAPHTHYLENE	EDL	0.3	TRESKONOFHENCL	· 59	10 - 123
2.E-DINITROTOLUENE	BOL	0.3	TETT HENYL-014	90	33 - 141
3-NITROANILINE	BDL	1			
ACENAPHTHENE	BDL	0.3	·		
1.4-DINITROPHENOL	BDL	1	"Trace" denotes probable presenc	e below listed d	etection limit.
4-NITROPHENOL	8DL	1			
DIEENZOFURAN	EDL	0.3		•	
1,4-DINITROTOLUENE	203	0.3		•	
DIETHYLPHTHALATE	BDL	0.3	ETL = EEL ON DETECTION LIMIT		
4-CHLORGPHENYL-PHENYLETHER	8DL	0.3	TENHUU REFERENCE: EPA SU SA6. 2	ND EDITION	
FLUORENE	BDL	0.3	METHOD 3550/2		•

Lab Number:
Sample Designation:
Date Analyzed:
Matrix:

10,429-13 2332-324 Fort Totten Soil #5 8/3/87 Solid

VOLATILE ORGANICS	CONCENTRATIO	N DETECTION LIMIT
	(ug/g)	(ug/g)
CHLOROMETHANE	BDL	
VINYL CHLORIDE	BDL	
CHLOROETHANE		. 1
BROMOMETHANE -	BDL	0.5
	BDL	. 1
METHYLENE CHLORIDE	BDL	0.5
1,1-DICHLOROETHYLENE	BDL	0.5
1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE	BDL	0.5
CHLOROFORM	BDL	0.5
1,2-DICHLOROETHANE	BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	
BROMODICHLOROMETHANE		0.5
1,2-DICHLOROPROPANE	BDL	0.5
	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
BENZEHE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	0.5
DIBROMOCHLOROMETHANE	BDL	0.5
BROMOFORM	BDL	
TETRACHLOROETHYLENE		0.5
1,1,2,2-TETRACHLOROETHANE	BDL	⁵ 0.5
	BDL	0.5
TOLUEŅE	BDL	0.5
CHLOROBENZENE	BDL	0.5
ETHYLBENZENE	BDL	0.5
•	•	•
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MEK	BDL	
VINYL ACETATE		2.5
MIBK	BDL	
2-HEXANONE	BDL	2.5
	BDL =	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
SURROGATE STANDARDS RECOVERY		
	RECOVERY	ACCEPTANCE LIMITS
	(%)	
d4-dichloroethane	98	(%)
d8-TOLUENE	107	70 - 121
BROMOFLUOROBENZENE		81 - 117
HOOVORDUTENS	105	74 - 121

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: EPA SW 846, 2ND EDITION
METHOD 8240

ACÍD/EASE/NEWTRAL/EXTRACTABLE OFFANSO COMPLINDA

Laboratory Number: 10.42%-14
Sample Designation: 2332-32% Fort Totten Soil #5
rate Extracted: 7/30/87
Late Analyzed: 3/3/87
Tathix: Soil

- Eaulita expressed on a dr/ 193 degrees C1 basis. Tolature content: 5,9%

,	47				₹
	CONCENTRATION	DETECTION LIMIT		CONCENTRATION	DETECTION LIM
	- (uş/g)	[ug/gi		luş/ç:	luş/ş
N-NITROSODIMETHYLAMINE	BD';	C. 2	4-NITROANILINE	801	1
- HENOL	BDL	0.3	4.6-DINITRO-2-METHYLPHENOL	891	:
1 lim (2-CHLOROETHYL ETHER)	SDL	0.3	N-NITROSODIPHENYLAMINE (1)	BOL	0.3
2-CHLOROPHENOL	851	0.3	4-BFOMOPHENYL-PHENYLETHER	801	1.7
1.3-DICHLOROBENZENE	3DL	0, 3	HEXACHLORGEENZENE	€DL	0,2
4-DICHLORGZENZENE	50L	9.3	PENTACHLOROPHENOL	e#L	ì
BENZYL ALCOHOL	£ 0 <u>L</u>	0.3	PMENANTHRENS	2 01	8.3
1.2-DICHLOROBENZENE	801	0.3	ANTHRACENE	Bil	: .;
I-METHYL PHENOL	BOL	0.3	DI-N-BUTYLEHTHALATE	EDL	5.2
18s {2-CHLOROISOPROPYL: ETHER	201	0.3	FLUORGANTHENE	Trace	5.2
1-METH LEMENOL	EOL .	0.3	EENZIDENE	<u> </u>	2
HEXACHLORGETHANE	BUL	0.3	FIRENE	£51	0.7
N-NITECSODI-N-FROTYLAMINE	35L	0.3	BUTYLEENZYLEHTHALATE	3 0L	2.2
ATTROPENIENE	BirL	6.3	3.3 -DICHLOROBERZIOINE	801	£.7
LEGEBORONE	301	٤,٤	SENZOUZ PANTHRACENE	- E51	6.3
1-11785785901	55.	€.3	CHENSENE	801	2.3
L. 4-DINETHYLFHENDL	901	è.3 -	BESIG-ETHYLHEXYL (PHTHALATE	1,7	7.7
BENZOIC ACID	50L	1	SI-N-CCTYLPHTHALATE	801	6. 2
Tis fe-CHLORETHONY METHANE	801	0.7	BENZO/BYFLUORANTHENE	Trace	* *
2.4-DICHUCROFHENDL	30L	0.3	SENZO A AFLUOFANTHENE	BOL	2.3
1.2.4-TRICHLORGEENZENE	501	0.3	BENEDIETRABNE	201	• • • • • • • • • • • • • • • • • • •
/ MAPHIHALENE	50L	0.3	IDENO(1.1.3-5.6)PYRENE	ani.	3.8
14-CHLOFDANILINE	801	0.3	DIBENZO: a. h JANTHRACENE	801	2.1
HEXACHLOROBL TADIENE	80.	0.3	EENZOI GUDUSTIPEFILENE	801	6.3
4-CPLORC-3-METHYLPHENCL	801	Q.3	Section of Paris Control of Section 1	•••	•••
-SETHYLNAPHTHALENE	ECL	0.3	SUBRODATE STANDARDE PECOVERY		
-EXACHLOROCYCLOFENTADIENE	EÓL	4.3	Andreas & Comment (Estable)	RECOVERY A	NCCEPTANCE LÍMIT
2,4.6-TRICHLORGERENCE	" BOL	9.3		[6]	14:
f 2.4.5-TRECHLORGEHENOL	50L	1	C-F1-FHENG	. 7	21 - 103
2-CHLORONAPHEHALENE	507	9.3	de Phinol		11 - 1
2-NITROANTLINE	8 01	1,	MITAGREMICHE-15	45	75 - 114
_DIMETHYLPHIMALATE	8:1	Č. 3	1-F - STERENY	4:	43 - 11:
ACENAFHTHYLENE	251	9.3 9.3	TELEROMOPHENOL	51	
2.+-DINITECTOLUENE	E0.	0.3	TERRHENYL-SIA		
2-NITRGANILINE	601	1		. . .	
ACEN4PHEHENE	601	0.3			
2.4-DINITROPHENOL	BOL	1	• • • • • • • • • • • • • • • • • • •		
4-NITROPHENCL	BUL	<u>.</u> 1	'Trace' denotes probable presence	i belon fritse des	ection limit.
DIBENZGFURAN		~	;		
2.4-DINITROTOLUENE	6DL	0.3			
DIETHYLPHTHALATE	BUL	0.3	PEL BRAIN AMERICAN AND THE	•	
4-CHLOROPHENYL-PHENYLETHER	BDL	û. 3	BOL = BELOW DETECTION LIMIT		
	BOL	0.3	METHOD REFERENCE: EPA SN 846. 21		3226
FLUORENE	BDL	0.3	#ETHOD 3550/8	170	•

Lab Number:
Sample Designation:
Date Analyzed:

Matrix:

10,429-16 2332-325 Fort Totten Soil #6 8/3/87 Solid

	VOLATILE ORGANICS	CONCENTRATION (ug/g)	DETECTION LIMIT (ug/g)
	CHLOROMETHANE	BDL	1.75
	VINYL CHLORIDE	BDL	1
	CHLOROETHANE	BDL	0.5
	BROMOMETHANE	BDL	1
	METHYLENE CHLORIDE	BDL	0.5
	1,1-DICHLOROETHYLENE	BDL	0.5
	1,1-DICHLOROETHANE	BDL	0.5
	1,2-trans-DICHLOROETHYLENE	BDL	0.5
•	CHLOROFORM	BDL	0.5
	1,2-DICHLOROETHANE	BDL	0.5
	1,1,1-TRICHLOROETHANE	BDL	0.5
	CARBON TETRACHLORIDE	BDL	0.5
	BROMODICHLOROMETHANE	BDL	0.5
	1,2-DICHLOROPROPANE	BDL	0.5
	1,3-trans-DICHLOROPROPENE	BDL	0.5
	TRICHLOROETHYLENE	BDL	0.5
	BENZENE	BDL	0.5
	1,3-cis-DICHLOROPROPENE	BDL	0.5
	1,1,2-TRICHLOROETHANE	BDL	` 0.5
	2-CHLOROETHYL VINYL ETHER	BDL	0.5
	DIBROMOCHLOROMETHANE	BDL	0.5
	BROMOFORM	BDL	0.5
	TETRACHLOROETHYLENE	BDL	0.5
	1,1,2,2-TETRACHLOROETHANE	BDL	0.5
	TOLUENE	BDL	0.5
	CHLOROBENZENE	BDL	0.5
	ETHYLBENZENE	BDL	70.5
	ACETONE	BDL	2.5
	CARBON DISULFIDE	BDL	0.5
:	THF	BDL	2.5
	MEK	BDL	2.5
	VINYL ACETATE	BDL	1
٠	MIBK	BDL	2.5
	2-HEXANONE	BDL	2.5
	STYRENE	BDL	0.5
	XYLENES	BDL	0.5
	•	•	

POLKOGNIE	PINDAKDS	KECOVEKI

	RECOVERY (%)	ACCEPTANCE LIMITS (%)
d4-DICHLOROETHANE	90	70 - 121
d8-Toluene	101	81 - 117
BROMOFLUOROBENZENE	100	74 - 121

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: EPA SW 846, 2ND EDITION
METHOD 8240

Resource Analysts, Incorporated

ACID/BASE/NEUTRAL EXTRACTABLE DRIVANTO COMPOUNDS

Laboratory Numbers 10.429-17 7/ tample Designations 2332-225 Fort Totten Soil ab Sate Extractege 7/30/57 Date Analyzes: 5/3/27 Soil

Results expressed on a prv (100 degrees () basis. Roisture content: 9,2%

	CONCENTRATION	DETECTION LIMIT		CONCENTRATION	DETECTION LIFE
* N-NITROSODIMETHYLÄMINE	8DL (39,9)	199791 Q. 8	A MYTECANTETAR	(uş/ş)	(L\$/\$)
	BDL BDL	y.c 0.3	4-NITROANILINE 4.5-DINITRU-2-METHYLPHENOL	BOL	ì
PHENCL		• • • • • • • • • • • • • • • • • • • •		8 0.	.1
Bis 12-CHLOROETHYL ETHER	50L	0.3	N-NITROSODIFHENYLAMINE (1)	-201	0.3
2-CHLORCPRENOL	BDL	0.3	6-BRONOPHENYL-PHENYLETHER	B DL	2.2
1.3-DICHLOROZENZENE	BDL	6.3	HEXACHLOROBENZENE "	301	÷:
1:4-DICHLOROBENZENE ""	BOL	0.3	PENTACHLOROPHENOL	8 01	•
FENZYL ALCOHOL	<u>3</u> 0L	6.3	PHENANTHRENE	EDL	1.1
1.13-DICHLOPOBENZENE	201	0.2	ANTHRACENE	8 01	€.?
I-METHYLEHENOL .	, BOL 1	0.3	DO-M-BUTYLEHTHALATE	20 0	·
Bis (2-CHLORDISCERGEYL) ETHER	201	0.3	FLUORGANTHENE	9.7	5.7
/ 4-METRYLPHENOL	3C_	5.3	BENZIDENE	. 20L	2
HEVACHL DROETHAME	80.	5.3	FYFENE	0.4	9,3
N-NITRIBODI-N-FRORY, ATUNE	201	g.3	BUTYLEENSYLERFHALATE	E (1.	5.3
NI TROPENZEKE	EUL	Ģ. 3	2.2°-010x10F12EX13D1KE	80%	6, -
LEGFHORCHE	Eil	5.3	EENZO: allanteracene	Trace	6.1
J-NITPOFFENDL	301	9.3	CHEYSENS	77316	5.3
1.4-DIMETHYLPHENGL		0.3	ESS SHETHYLHEMYL FRATHALATE	: :	3.3
EEKZDIC ACID	SOL		DI-A-GCTYLFFINALATE	***	4.1
Els (2-CHLORETHOX7) METHANE	801	0.3	Bénző: Bifeugramthéns	2.7	1.1
2.4-DICHLOPOPHENOL	BDL	C. 3	BENZOIK IFLUGRANTHENE	BOL	2.3
1.2v4-TRICHLORGBENZENE .	. BDL	¢.3	BENZOLA PREME	5.7	
NAPHTHALENE	BDL	0.3	IDENO(1.2.3-c.:)FYRENE	EO.	
4-CHLOROANILINE	BDL	ē.3	DISENZO: B.F !ANTHRACENE	801	0.3
HEXACHLORGEUTADIENE	BOL	g. 3	SENTO(g, n. 1)PEFYLENE	EGL	3.3
4-CHLORG-3-RETHYLFHENCL	201	0.2	METER TITLE IN THE CENTER	b - ' b	***
2-METHYLNAFHTHALERE	ED_	0.3	SURFOGATE STANSARDS PECOVERY		
HE KACHLOROCYCLOPENTADIENE	BDL	0.3	CANCEL CONTRACTOR CONTRACTOR	RECOVERY A	CCEPTANCE LIVI
1.4.6-TRICHLORCPHENOL	BOL	0.3	•	(%)	(a)
1.4.5-TRICHLYROPHENIL	EOL	1	3-FE-PHENOL	35	11
2-CHLORONAPHIHALENE	801	0.3	de-PHENO.		15 - 94
2-NITROANILINE	BDL	1	NITROBENZENE-EF	61	35 - 114
DIMETHYLEHTHALATE	BUL	9.3	2-FL-BIPHENYL	5.1 5.1	43 - 11:
ACENAFHTHYLENE	BDL	C.3	TRIBROMOFHENGL	7C	16 - 123
2.5-DINITROTOLUENE	501	0.3	TERPHENY014		
3-NITROANILINE	BOL		IIRFRIRIL*GI6	64	38 - 141
ACENAPHTHENE		1			
2.4-DINITROPHENOL	2 01	5.3	••		
4-NITRUPHENOL	BOL	1	'Irace' denotes probable presence	Delow listed det	ection limit.
	BD.	1			•
DIEENZCFURAN	BDL	0.3			
2.4-DINITROTOLUENE	EDL	0.3	·		
DIETHYLPHTHALATE	BDL	0.3	BDL = BELOW DETECTION LIMIT	•	
4-CHLOROPHENYL-PHENYLETHER	BD'.	C. 3	METHOD REFERENCE: EPA SN 846. 2M	EDITION	
FLUCRENE	BDL	0.3	METHOD 3550/82	70	

Lab Number:

Sample Designation:

Date Analyzed: Matrix:

10 -429-19

2332-326 Fort Totten Soil #7

8/3/87

Solid

VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
	(ug/g)	(ug/g)
CHLOROMETHANE	BDL	1
		* * * * * * * * * * * * * * * * * * *
VINYL CHLORIDE	BDL	<u> </u>
CHLOROETHANE	BDL	0.5
BROMOMETHANE	BDL	1
METHYLENE CHLORIDE	BDL	0.5
1,1-DICHLOROETHYLENE	BDL-	0.5
1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE	BDL	0.5
	The state of the s	
CHLOROFORM	BDL	0.5
1,2-DICHLOROETHANE	BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	- BDL	0.5
BROMODICHLOROMETHANE	- BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
		- · - ·
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	0.5
DIBROMOCHLOROMETHANE	BDL	0.5
BROMOFORM	BDL	0.5
TETRACHLOROETHYLENE	BDL	0.5
1,1,2,2-TETRACHLOROETHANE	BDL	0.5
TOLUENE	BDL	0.5
CHLOROBENZENE	BDL	0.5
ETHYLBENZENE	BDL	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBK	BDL	2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
and the state of t	BDB	0.5
CUPPOCAME CMANDARDS RECOVERY		
SURROGATE STANDARDS RECOVERY	**************************************	· ·
	RECOVERY	ACCEPTANCE LIMITS
	(%)	(%)
d4-DICHLOROETHANE	88	70 - 121
d8-Toluene	100	81 - 117
BROMOFLUOROBENZENE	100	74 - 121
	100	14 - 797

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: EPA SW 846, 2ND EDITION

METHOD 8240

Resource Analysts, Incorporated

ACID/BASE/NEUTRAL EXTRACTABLE CROWNIC COMPOUNDS

Laboratory Number:

18.429-29

Sample Designation:

2232-316 Fort Tetter Soil 47

Date Extracted: ----Date Analyzed:

7/30/27 7/31/27

Batroxe

5011

Rebuits expressed on a ony 1113 degrees 01 basis. ... Moisture content: 35%

-	CONCENTRATION (Up/s)	DETECTION LIMIT		CONCENTRATIO	
	BDL	(3979) G.E	4-NITROANSLENE	EUL EUL	(upig
N-NITROECDIRETHYLARIYE	50L 50L	0.5 0.3	4.6-DINITRO-2-METHYLFHENOL	201 201	
Prenci	80L	0-3 C.3	N-NITROSODIFHENYLAMINE (11)	•	
Eig F1-CHLORGETH FL ETHER S		0.3	4-BROMOPHENTL-PHENTLETHER	-291 901	6 6.3
1 - CHL GROPHENII	BOL				
:.3-DICHLOROZENZENS	₽DT	9.3	HEVACHLOROBENZENE -	BD1	1.1
144-DICHLOROPENIENE	BDL	5.3	PENTACHLOROPHENOL	16.34 ESL	
BENZYL ALCOHOL	BD2	0.3	PHENANTHRENE	EDL	0.3
149-DICHLOROBENZENE	801	0.3	ANTHRACENÉ	501	\$r. 2
2-METHYLFHENCL	, 3DL .	0.3	DI-N-BUTYLEHTHALATE	BDL	5.3
Eis [2-CHLORGISCEROFY] ETHER	BOL	0.3	FLUORDANTHENE	ECL	1.3
4-METHYLPHENOL	BOL	0.3	SENZIDENE	80L	2 (,
HEXACHLOROSTHANE	89 .	<u>0.3</u>	FYRENE	BIL	£.3
N-NITROSCOI-N-PROPYLAMINE	801	0.3	BUTYLBENZELPHTHALATE	200	0.3
NITROBENIENE	⁷⁵ BDL	0.3	3.3°-DICHLORCEEAZIDINE	30L	٢.٦
ISOFMORONE	20_	0.3	EENZO1 & JANTHRACENE	: 01	E.S
2-ASTROFHENOL	EDL	Ç.3	CHEVEERE	861	2. 3
2.4-DIMĒTHYLPHĒNOL	BOL	5.1	eşşşo-ethylhekyl yekthalatê	1.5	1.1
PENZING ACID	20.	.	BI-N-BCTYLPHTHALATE	£.7/1	f. 7
Bis 12-CHLORETHÓXY: METHANÉ	BDL	0.3	BENZZEBAFLUGRANTHENE	£0.	1.3
1.4-DICHLOROFHENCL	BOL	0.3	EENZO(NIFLOCKANTHENS	3 : _	5.3
1.2.4-TRICHLORDSENTENE	S DL	6.3	BENZO'A PENENE	EDT.	
NAPHIHALENE	BOL	0.3	IDENGIA. 2.3-c. 3.FYRENE	301	3.3
4-CHLORDANILIME	₿û⊊	0,3	DIBENZO BURNANTHRACENE	SUL	::
HE XACHUBROBUTAD LENE	801.	5.3	EENZOIS, N. E. FERYLENE	30.	1.1
4-CHLORG-3-METHYCRHENOL	EDL	0.3	•	•	
3-METRYLRAPHIBALENE	8 01	9.2	SURROGATE STANDARDS RECOVERY		
HÉXACHLOROCYCLÓFENTALIENE	BDL	0.3		RECOVERY	ACCEPTANCE LIT
2.4.6-TRICHLOROPHENO.	BUL	0.3	•	[%]	£ 6 ,7
I.4.5-TRICHLOROFHENOL	BDL	1	. 2-F1-FHENOS	27	11 - 17.
I-CHLORUNAPHTHALENE	BOL	G. Š	GO-FRENOL	35	10 - 4.
2-NITROANILINE	BDL	1	NITROPENZENS-15	23	35 % 11.
DIMETHYLPHTHALATE	8 91	0.3	2-F1-Bifkeryl	2:	42 - 11s
ACENAPHTHYLENE.	205	0.3	TRIEROMOPHENOL	22	15 - 123
2.e-DINITRCTOLUENE	BD_	0.3	TERPHENYL-014	•	23 - 14.
3-NITROANILINE	EDL		and the state of t	•	
ACENAFHIHENE	BDL	0.3			
2.4-DINITROPHENCE	20L	1			•
4-KITROPHENOL	85L	1		•	•
DIEENZOFURAN	BOL	0.3			*
1.4-SINITROTOLUENE	BDL	0.3			T.
DIETHYLPHTHÄLATE	BD1	0.3	EDL = BELOW DETECTION LIMIT		
4-CHLOROPHENYL-PHENYLETHER	BDL	0.3	METHOD REFERENCE: EPA SW ECC. 2	un entiton -	
FLUGRENE	801	0.3	METHOD REFERENCE: EFA SA ESET ZI		
· #AAUFIIP	591	U. J	ELINUV 3339/3.	210	

Lab Number: 10,429-22 2332-327 Fort Totten Soil #8 Sample Designation: 8/3/87 Date Analyzed: Matrix: Solid

VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
	CONCENTRATION (ug/g)	(ug/g)
CHLOROMETHANE	BDL	1
VINYL CHLORIDE	BDL	
CHLOROETHANE	BDL	0.5
BROMOMETHANE	BDL	1
METHYLENE CHLORIDE	BDL	0.5
1 1 - DICUI OPORTUVI FUE	BDL	
1,1-DICHLOROETHYLENE 1,1-DIGHLOROETHANE	ומפ	0.5 0.5
1,2-trans-DICHLOROETHYLENE	BDL	
	BDL	0.5
- CHLOROFORM	BDL	- 0.5
1,2-DICHLOROETHANE	BDL	0 . 5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	~ BDL	0.5
BROMODICHLOROMETHANE 1,2-DICHLOROPROPANE	BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	: BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,3-cis-DICHLOROPROPENE 1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	0.5
DIRROMOCUI OROMEMUNNE	D.D.A.	0.5
BROMOFORM	BDL	0.5
TETRACHLOROETHYLENE	BDL	0.5
1,1,2,2-TETRACHLOROETHANE	BDI.	0.5
TOLUENE	BDL	0.5
CHLOROBENZENE		
ETHYLBENZENE	BDL	0.5
EIRIDBENZENS	BDL	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL .	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBK	BDL	2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	. 0.5
XYLENES	BDL	0.5
***	900	U.5
SURROGATE STANDARDS RECOVERY		
	RECOVERY	ACCEPTANCE LIMITS
	(%)	(%)
d4-Dichloroethane	88	70 - 121
d8-Toluene	(94)	81 - 117
BROMOFLUOROBENZENE	101	74 - 121

BDL = BELOW DETECTION LIMIT METHOD REFERENCE: EPA SW 846, 2ND EDITION METHOD 8240

ACID/BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

Laboratory Number:

10,429-23

Smaple Designation:

2332-327 Fort Totten Soil #8

Date Extracted: 😕

7/30/87

Date Analyzed:

7/31/87

Matrix:

FLUORENE

Solid

Results expressed on a dry (103 degrees C) basis.

Moisture content:

213

	÷	CONCENTRATION	DETECTION LINIT		CONCENTRATION	DETECTION LIMI
	••	REP 1. REP 2		•	REP 1 REP 2	(ug/g)
		(ug/g) (ug/g)	e per en		(ug/g) (ug/g)	
٠	N-NITROSODIMETHYLAMINE	BDL BDL	0.8	&-MITROANILINE	BDL BDL	· 1
	PHENOL	BOL BOL	0.3	4,6-DINITRO-2-METHYLPHENOL	BDL BLD	. 1
	Bis (2-CHLOROETHYL ETHER)	BOL BOL	0.3	N-NITROSODIPHENYLAMINE (1)	BOL BOL	0.3
•	2-CHLOROPHENOL	BDL BDL	0.3	1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	BDL BDL	0.3
	1,3-DICHLOROBENZENE	BOL BOL	0.3		E BOL BOL	0.3
	1,4-DICHLOROBENZENE	BDL BDL	0.3	HEXACHLOROBENZENE	BDL BDL	0.3
	BENZYL ALCOHOL	BDL BDL	0.3	PENTACHL OROPHENOL	BOL BOL	1
	1,2-DICHLOROBENZENE	BDL BDL	- 0.3	PHENANTHRENE	BDL Trace	0.3
	2-METHYLPHENOL	BOL BOL	0.3	ANTHRACENE	BDL 1.0	0.3
	Bis (2-CHLOROISOPROPYL) ETHER	BDL BDL	0.3	DI-N-BUTYLPHTHALATE	BOL BOL	0.3
	4-METHYLPHENOL	BOL BOL	. 0.3	. FLUORDANTHENE	(0.6 1.9	0.3
	HEXACHLOROETHANE	BOL BOL	0.3	BENZIDENE	BDL BDL	2
	N-NITROSODI-N-PROPYLAMINE	BOL BOL	0.3	PYRENE	Trace 1.2	0.3
	NITROBENZENE	BDL BDL	0.3	BUTYLBENZYLPHTHALATE	BOL BOL	0.3
	ISOPHORONE	BOL BOL	0.3	3.3'-DICHLOROBENZIDINE	BDL BDL	0.7
	2-NITROPHENOL	BOL BOL	0.3	BENZO(a)ANTHRACENE	(BDL 0.6	0.3
	2,4-DINETHYLPHENOL	BDL BDL	0.3	CHRYSENE	BOL 0.5	0.3
	BENZOIC ACID	BDL BDL	1	Bis(2-ETHYLHEXYL)PHTHALATE	1.0 0.6	0.3
	Bis (2-CHLORETHOXY) METHANE	BDL BDL	0.3	DI-N-OCTYLPHTHALATE	BDL BDL	0.3
	2,4-DICHLOROPHENOL	BDL BDL	0.3	BENZO(b)FLUORANTHENE	(BDL 0.9	0.3
	1,2,4-TRICHLOROBENZENE	BOL BOL	0.3	BENZO(k)FLUORANTHENE	BDL BDL	0.3
	NAPHTHALENE	BDL BDL	0.3	BENZO(a)PYRENE	B DL 0.5	0.3
	4-CHLOROANILINE	BOL BOL	0.3	IDENO(1,2,3-c,d)PYRENE	BDL BDL	0.3
	HEXACHLOROBUTADIENE	BOL BOL	0.3	DIBENZO(a,h)ANTHRACENE	BDL BDL	0.3
	4-CHLORO-3-METHYLPHENOL	BDL BDL	0.3		BOL BOL	0.3
	2-METHYLNAPHTHALENE	BDL BDL	0.3	,	_	
	HEXACHLOROCYCLOPENTADIENE	BOL BOL	- 0.3	SURROGATE STANDARDS RECOVERY		-
•	2,4,6-TRICHLOROPHENOL	BOL BOL	0.3		RECOVERY	ACCEPTANCE LIHI
	2,4,5-TRICHLOROPHENOL	BOL BOL	1	•	(\$)	(\$)
	2-CHLORONAPHTHALENE	BDL BDL	0.3	2-FL-PHENOL	9 11	21 - 100
-	2-NITROANILINE	BOL BOL	1	d6-PHENOL	20 26	10 - 94
	DINETHYLPHTHALATE	BDL BDL	0.3	NITROBENZENE-d5	1 5	23 - 120
	ACENAPHTHYLENE	BOL BOL	0.3	2-FL-BIPHENYL	14 14	30 - 115
	2,6-DINITROTOLUENE	BOL BOL	0.3	TRIBROMOPHENOL	24 16	10 - 123
	3-NITROANILINE	BOL BOL	1	TERPHENYL-014	12 18	18 - 137
	ACENAPHTHENE	BDL BDL	0.3	•		
	2,4-DINITROPHENOL	BOL BOL	1	"Trace" denotes probable presence	below listed de	tection limit.
•	.4-MITROPHENOL	BDL BDL	1	• •	•	
	DIBENZOFURAN	BOL BOL	0.3			• •
	2,4-DINITROTOLUENE	SOL BOL	0.3		** *	
	DIETHYLPHTHALATE	BDL BDL	0.3	BDL = BELOW DETECTION LIMIT	· · · · · · · · · · · · · · · · ·	-
	4-CHLOROPHENYL-PHENYLETHER	BDL BDL	0.3	METHOD REFERENCE: EPA SU 846, 2ND	EDITION	

0.3

BOL

METHOD 3550/8270

Lab Number:

Sample Designation:

Date Analyzed:

10,429-25

2332-328 Fort Totten Soil #9

8/3/87 Solid

Matrix:

VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
	(ug/g)	(ug/g)
CHLOROMETHANE		1
VINYL CHLORIDE	BDL	1
VINYL CHLORIDE CHLOROETHANE BROMOMETHANE METHYLENE CHLORIDE	BDL	0.5
BROMOMETHANE	BDL	1
METHYLENE CHLORIDE	BDL	0.5
METHYLENE CHLORIDE 1,1-DICHLOROETHYLENE	BDL BDL	0.5
1,1-DICHLOROETHANE	- BDL	0.5
1,2-trans-DICHLOROETHYLENE		0.5
CHLOROFORM 1,2-DICHLOROETHANE	BDL	0.5
1,2-DICHLOROETHANE	BDL	- 0.5
1,1,1-TRICHLOROETHANE	BDL	0 <i>:</i> 5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE	BDP	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER		0.5
DIBROMOCHLOROMETHANE BROMOFORM TETRACHLOROETHYLENE	BDL	0.5
BROMOFORM	BDL	0.5
TETRACHLOROETHYLENE	BDL	0.5
1,1,2,2-TETRACHLOROETHANE	BDL	0.5
10101111	יחתם	0.5
CHLOROBENZENE	BDL	0.5
ETHYLBENZENE	BDL	0.5
1 CDBALD		
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1 2
MIBK	BDL	2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
	· · · · · · · · · · · · · · · · · · ·	Description (Control of Control o

SURROGATE STANDARDS RECOVERY

And the second of the second of		RECOVERY	ACCEPTANCE LIMITS
		(%)	(%)
d4-dichloroethane		92	70 - 121
d8-Toluene		105	81 - 117
BROMOFLUOROBENZENE	And the second s	103	74 - 121

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: EPA SW 846, 2ND EDITION METHOD 8240

Resource Analysts, Incorporated

ACID/BASE/NEUTRAL EXTRACTABLE ORGANIC CONFOUNDS

Laboratory Number: 13.429-26 2332-328 Fort Totten Soil #9
Date Extractec: 7/30/27
Date Analyzed: 7/31/37
Matrix: Solid

Results expressed on a dry [12] degrees 0) basis. Polisture content: 134

-	CONCENTRATION	DETECTION LIMIT		CONCENTRATION	DETECTION OF
	(uç/g'	(up/s)		142/21	
- N-NITFOSODIMETHYLAMINE	50.	C. E	L-NITROANILINE	ŧo.	:
F-ENT_	501	0.3	4.5-DIMITAL-2-METHYLEHENOL	₹01	•
ELE (C-CHIOFOECHY) ETHEF	201	€.3. [™] -	N-NITROEODIFHEN/LAMINE EL!	E01	Ş. T
2-CHLOF DEHENCL	\$UL	9.3	4-BROMOFHERYS-FHENYSETHER	2.	
1.3-D1CHLORGEENZENE	201	Φ_{i} 3	HE KACHLOR VEEKZENE		6. 7
1.4-DICHLORIEENZENE	801	0.3	PENTACHLOROPHENCL	3. €	·:
BENZYL ALCOHOL	301-	0.3	FRENANTHRENE	2).	1.1
1.2-DICHLOROBENZEKE	801	9.3	L ANTHRACENT	5 :.	
2 PETHYLPHENOL	9:	- 9.3	DI-A-EUTYLFHTHALATE	EGL	
Bis 12-CHLOROISOFROFY, FINER	301	0.3	RLUCROANTHENE	1 51	* *
4-METHYLPHENOL	3DL	0.3	BENZIGENE	3 01	• • •
HEXACHLORDETHANE	BOL	° 0.3	FYRENE	801	•
N-NITROSOSI-N-PROPYLAMINE	ECL	0.3	ENTYLEENTYLEFTHALATE	800	• •
NITPOBENZENE	AN BDL	0.3	3.3°-DICHLORGEENZIDINE	ĒD.	
ISOPHORONE	801	8.3	EENZD-E:ANTHRACERE	20	¥
2-NITROFHENOL	BDL	9.3	CHRISTNE	801	
2.4-DIMETHYLFFENGL	30r	0.3	Bos 3-ETHYLHEXYL 1FFTHALATE	5¥.	
FENZOIC ACID	851	1	DI-K-OSINLEBTHALATE	1	: !
Els (2-CHLORETHOXY) METHANE	₹ % L	0.2	SENIOLO FLUGRANIMENS	30:	Q
2.4-DICHLORDPHENOL	201	0.3		EOL	Ş.3
1.2.4-TP1CHLOPOBEAZENE	80L	5.3	EENZC() FLUORANTHENE	501	
AAPHTHALEAE	EDL	0.3 0.3	PENZO E PYRENE	201	
4-CHLOROANTLINE	50L	6.3 5.3	IDENO(1.1.3-s.d)FYFENE	E.7	•••
HEXACHLOROBUTACIENE	BDL		DIEENZOTE. HAANTHRACENE	3 0L	5.3
4-CHLGRO-3-PETHYLFHENOL	501 501	0.3	BENZO S.h. i ipefylene	891	5.3
2-METHYLAPHTHALEAE		0.3	*******	. •	
HEXACHLOROCYCLOFENTADIENE	. BOL,-	Û. 3	SURROGATE STANDARDS RECOVERY		4-
2.4.6-TRICHLOROPHENOL	EDL	0.3			CCEFTANCE LIFT
	BDL	9.3		(\$)	(18)
2.4.5-Trichlorophenol 2-Chloromaphthalene	BDL	1	2-FL-PHENOL	12	21 - 137
	BOL	0.3	de-FHENCL ·	2:	15 - 90
2-NITROANILINE	EDL	1	NITROBENZENE-de	٤	35 - 114
DIMETHYLPHTHALATE	BDL	0.3	2-FL-BIPHENYL	17	43 - 115
ACENAPHTHYLENE	907	0.3	TRIBROMOFHENOL	lė.	10 - 111.
2.5-BINITROTOLUENE	BOL	9.3	TERPHENYL-dia	56	33 - 141
3-NITROANILINE	EDL	1			
ACENAPHTHENE	BDL	0.3	·		•
2.4-DINITROPHENOL	BOL	1			
4-NITROPHENOL	B Ci	1			
Dieenzofuran	BDL	C.3			
1.4-DINITROTOLUENS	EDL	0.3			
DIETHYLFETHALAGE	201	0.3	EDL = BELOW DETECTION LIMIT		
4-CHLOROPHENYL-PHENYLETYER	BOL	0.3		PATTIEN	•
FLUORENE	50L 1		METHOD REFERENCE: EPA SH 844. 2ND		
	59L	0.3	METHOD 3550/827	<u>.</u> .	

Laboratory Number: Sample Designation:

Date Analyzed:

10,429-28

2332-330 Fort Totten Soil #11

8/18/87 Solid

Matrix:

PCB-1016

PCB'S DETECTION LIMIT CONCENTRATION REP 1 REP 2 (ug/g) (ug/g) (ug/g) - PCB-1242 BDL BDL 0.08 PCB-1254 BDL BDL 0.16 PCB-1221 BDL " BDL 0.08 PCB-1232 BDL BDL 0.08 PCB-1248 BDL BDL 0.08 PCB-1260 BDL BDL 0.16

BDL

0.08

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: BPA SW 846, 2ND EDITION

METHODS 3540 AND 8080

BDL ·

Laboratory Number: Sample Designation: Date Analyzed:

Matrix:

232-331 Fort Totten Soil #12 8/01/87 Solid

10,429-29

PCB'S DETECTION LIMIT CONCENTRATION (ug/g) (ug/g) PCB-1242 BDL 0.08 PCB-1254 0.16 BDL PCB-1221 BDL 0.08 PCB-1232 BDL 0.08 PCB-1248 BDL 0.08 PCB-1260 BDL 0.16 PCB-1016 BDL 0.08

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: EPA SW 846, 2ND EDITION
METHODS 3540 AND 8080

Lab Number: Sample Designation: 10,429-31 2332-333 Ft Soil Sam Blk #1

Date Analyzed: Matrix:

Water

VOLATILE ORGANICS	CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
CHLOROMETHANE	BDL	10
VINYL CHLORIDE	BDL	10
CHLOROETHANE	BDL	5
BROMOMETHANE	BDL	5
METHYLENE CHLORIDE	31	5
1,1-DICHLOROETHYLENE	BDL	5
1.1-DICHLOROETHANE	BDL	5
1,2-trans-DICHLOROETHYLENE	BDL	5
CHLOROFORM	BDL	5
1,2-DICHLOROETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	5 .
CARBON TETRACHLORIDE	BDL	, 5
BROMODICHLOROMETHANE	BDL	· 5
1,2-DICHLOROPROPANE	BDL	
1,3-trans-DICHLOROPROPENE	BDL	5
TRICHLOROETHYLENE	BDL	5
BENZENE	BDL	5
1,3-cis-DICHLOROPROPENE	BDL	5
1,1,2-TRICHLOROETHANE	BDL	5
2-CHLOROETHYL VINYL ETHER	BDL	5
DIBROMOCHLOROMETHANE	BDL	5
	BDL	5
BROMOFORM	BDL	5
TETRACHLOROETHYLENE	BDL	5
1,1,2,2-TETRACHLOROETHANE	5	-5
TOLUENE	-	5
CHLOROBENZENE	BDL BDL	5
ETHYLBENZENE	806	3
ACETONE	BDL	25
CARBON DISULFIDE	BDL	5
THF	BDL	25
MEK	** BDL	25 .
VINYL ACETATE	BDL	10
MIBK	BDL	25
2-HEXANONE	BDL	25
STYRENE	BDL	Ţ 5
XYLENES	BDL	5
** • • • • • • • • • • • • • • • • • •	,	
SURROGATE STANDARDS RECOVERY	MA.	
•	•••	ACCEPTANCE LIMITS
	(多)	(%)
d4-DICHLOROETHANE	84	76 - 114
	4.0.0	00 _ 110

100

93

BDL = BELOW DETECTION LIMIT

d8-TOLUENE

BROMOFLUOROBENZENE

METHOD REFERENCE: EPA SW 846, 2ND EDITION METHOD 8240

Resource Analysts, Incorporated

88 - 110

86 - 115

ACID/BASE/NEUTRAL EXTRACTABLE DESANTA CAMPROUNTS

Escoratory Number: Sample Designation:	10.429-32 2332-333 Ft Torren Smill. 41
Date Extracted:	7/24/57
Date Analyzed:	7/81/27
fattis	Hater

•	; · · · · -	CONCENTRATION Fugili	DETECTION LIMIT	·	CONCENTRATE:	% DETERTION LTY ************************************
		The state of the s				198 • Q
	N-NITEGEODIMETHYLAMINE .	501	25	U-NITHOM CLINE	5 %1	5.
	Zugen) Colores	BDC	15	4.6-SINTYRO-IMPTRYLEMENCE	ED.	* :
	Bis 10-CHLOROBINYL ETHER	EDL	12	N-NITHOSOCIAMENYLAMINE (1)	E.L	
r ·	I-CHICROFHENCI	50.	15	4-Broku l H enyl -Pi enylether	BOL	
	1.3-DICHLORGEENZENE	EDL	1E -	HE NACHUGE GEERZENE	_~	10
	1.4-DICHLORGEENZENE	801	12	Pentachlofofhenol	ÉSI	11
	PENZYL ALCOHOL	BDL	15	FHENANTHEENE	8 52	
	1.2-DICHLOROBENZENE	BD1	_ 10	ANTHRACENE	Birt	11
	2-METHYLFHENGL	# 8DL	10	DE-N-BUTYLERSTHALATE	8 51	- 4.5
	Bis (2-CHLCROISOPROPYL! ETHER	507	10	FLUOPOANTHENE	30L	.0
	4-METHYLPHENOL	BDL	10	SENZIDERE	ED1	100
	HEXACHLOROETHANE	BUL.	.25	PYRENE	BOL	13
	N-NITROSCDI-N-PROPYLAMINE	804	.10	BUTYLBENZYLEHTHALATE	EDL	
	NITPOBENZENE	75, 500 301	10 .	2.3'-DITHLORGEENZIDINE	201	55
	TEOFHOFINE	BOL	10	BENZO :: AN THEACENE	30.	
	i-aitpopherol	E01	15	CHRYSEN	E91	1.5
	1.a-DIMETHYLPHENCL	EDL	15	Englishmen ver Hathat ATE	5.3	:0
	BENJOIC ACID	504	350	NI-N-ACTO LECTIONAL ATE	801	1.
	Fis (2-CHLORETHOXY) METHANE	6D1	22	BENZOS FLEDERANTHENE	EOL.	••
	1.4-DICHLORDEMENGL	801	12	SENZO CO FRANCHENE	800	••
	2. 4-TRICHLORGEENZENE	E01	.u	EENZOGE PONTATE	201	
	NAF MIMALENE.	BD.	10	ideng Laura B-n. Ele yrene	50L	15
	4-CHLORGANILINE	S DL	n	DISENCO ALTI LANTHE ACENE	BDL	10
	ENECATUEOROLHOAKEN	801	<u></u>	BENZO'S. T. I FIRYLENE	801	12
	4-CHLORO-3-METHYLFHENOL	Ĵūŝ		Section Company of the Control of th		
	2-METRYLNAPHTHALENE	B01	17	SURROGATE ETANDARDS RECOVERY		,
	HEXACHLOROCYCLOFENTADIENE	EDL	11	Agricon of the talking the reference.	RECOVERY	ACCEPTANCE (IT)
	0.4.1-TRICHLOROPHENCL	BDL	n)		[%]	(4:
	1.4.5-TRICHLORGPHENOL	251	5:	S-FL-PHERON N	4.5	21 - 188
	2-CHLORONAPHTHALENE	BOL	r)	GPHENOL	42	10 - 66
	2-NITROANILINE	BOL	30	NITROBENZENE-do	190	35 - 11.
	DIRETHYLPHTHALATE	801	1D .	I-LANEXL	<u></u>	43 - 1iz
	ACENAPHTHYLENE =	507	ņ	TR LEED THE HOL	5:	10 - 101
	2.6-DINITROTOLUENE	BDL	*55	TERRIENT 1-214	9:	33 - 1-1
	2-WITROANILINE	EDL	5 0	i provincia provincia de la compansión	₹ •	V
	ACENAPHTHENE	BDL	10			
	2.4-DINITROPHENCL	BDL	50			
	4-NITROPHENOL	BOL	.ac .ac			
	DIBENZOFURAN	BDL BDL		·		
	2.4-DINITECTOLUENE		T.	•	4 4	
	SIETHYLFHTHALAGE	BDL	77.E	98: 100:1931 0000000000 AL 1 04000		
		BDL	177	EDL = EFICH THIECTION LIMIT		
	L-CHLOROPHENYL-PHENYLETHER	BOL	25	METHOD RETURNIE: 40 CFR FART 1	se, friday, octo	51# 76. 151a
	FLUCRENE	ZOL	<u> 12</u>	METHOD 625		

Lab Number: Sample Designation:

Date Analyzed: Matrix:

10,429-34

2332-335 Ft Soil Trav Blk #1

8/3/87 Water

VOLATILE ORGANICS -	CONCENTRATION (ug/L)	DETECTION LIMIT (ug/L)
CHLOROMETHANE	BDL	10
	BDL	10
VINYL CHLORIDE	BDL	5
CHLOROETHANE	BDL	5
BROMOMETHANE	12	5
METHYLENE CHLORIDE	BDL	5
1,1-DICHLOROETHYLENE	BDL	5
1,1-DICHLOROETHANE	BDP	5 5
1,2-trans-DICHLOROETHYLENE	BDL	5
CHLOROFORM		5
1,2-DICHLOROETHANE	BDL	
1,1,1-TRICHLOROETHANE	BDL	5
CARBON TETRACHLORIDE	BDL	5 , E
BROMODICHLOROMETHANE	BDL	5
1,2-DICHLOROPROPANE	BDL	5 5
1,3-trans-DICHLOROPROPENE	BDL	5 5
TRICHLOROETHYLENE	BDL	
BENZENE	BDL	5
1,3-cis-DICHLOROPROPENE	BDL	5
1,1,2-TRICHLOROETHANĒ	BDL -	5 5 5
2-CHLOROETHYL VINYL ETHER	BDL	. 5
DIBROMOCHLOROMETHANE	BDL	5
BROMOFORM . I'	BDL	5
TETRACHLOROETHYLENE	BDL	5
1,1,2,2-TETRACHLOROETHANE	BDL	<u> </u>
TOLUENE	6 ·	5
CHLOROBENZENE	BDL	5
ETHYLBENZENE	BDL	5
ACETONE	BDL	25
CARBON DISULFIDE	BDL	5
THF	BDL	. 25
MEK	BDL	25
VINYL ACETATE	BDL	10
MIBK	BDL	2 5
2-HEXANONE	BDL	25
STYRENE	BDL	5
XYLENES	BDL	5

RECOVERY (%)

86 100

BDL = BELOW DETECTION LIMIT

SURROGATE STANDARDS RECOVERY

d4-DICHLOROETHANE

BROMOFLUOROBENZENE

d8-TOLUENE

METHOD REFERENCE: EPA SW 846, 2ND EDITION

METHOD 8240

ACCEPTANCE LIMITS

76 - 114 88 - 110

86 - 115

· (%)

MATRIX SPIKE DUPLICATE RECOVERY

Laboratory Number: 10,429-34
Sample Designation: 2332-335 Ft Soil Trv Blk #1

Date Analyzed:

8/3/87

Matrix:

Solid

			REPLICATE 1		
COMPOUND	ug/g IN SAMPLE	ug/g SPIKE	ug/g FOUND	%REC-	
1,1-DICHLOROETHENE	0	54	62	115	
TRICHLOROETHYLENE	0	67	70	104	
BENZENE	, 0	- 5 2	57	110	
TOLUENE	· 6	54	61	102	
CHLOROBENZENE	0	58	65	112	

METHOD REFERENCE: EPA SW 846, 2ND EDITION METHOD 8240

ACID/BASE/NELTRAL EXTRACTABLE ORGANIC COMPOUNDS

Lateratory Nutter:	
Hample Designation:	ālk
Deta Extractega	7/30/97 ×
Date Analyzed:	7/31/17
Table 1	Solid

Results expressed on a $\sigma_{\rm c} = 100$ degrees C1 basis. Missoure contents (-

· -		DETECTION LIMIT	er	COMMENTERIO	
	(uş/s)	(up/p) "		iug/g	192/2
- A-NITROSODIMETHYLAMINE	EDL	8.0	4-NITROANILINE	301	÷
FRENOL	851	0.3	w.: PDINITRY PHETRY PHENC	20.	÷
TELS IZ-CHLORGETHYL ETFER	BDL	C.3	N-NITA DECDIFHENYLAMINE (1)	105	
1-CHLOROPHENOL	30L	t.3	4-BRÖMDFHENYL-PHENYLETHER	80.1	• • •
1.3-DICHLOROBENZENE	ēDL.	9.3 ↔	HEXACHLOROBENZENE	FOL	1.3
1.4-DICHLOROEENZENE	BDL	2.3	PENTACHLOPOPHENOL	, BD1	• 1
EENZML ALCOHOL	BDL	0.3	PHÉNANIHRENE	€ÐL	2,3
1.0-DICHLOROZENZENE	BOL	3.3	ANTHRACENE	BPL	0.3
1-metaylphenot	3DL	5.3	BI-N-BUTYLFHTHALATE	- 305	
Bos Ca-ChughQESGPFOFtu- ETHER -	874 874	0.3	feughgantherë	E 01	3, 3
, 4-METHYLFHENÖL	BDL	0.3	EENZYDENE	EDL	:
MEXACHL DROETHANE	551	6.3	FYREAE	5 00	4.1
W-NITROBOGI-N-PROFYLAMO (E	201	2.3	BUTYLBENÍMLEHIKALATE -	€0L	1.1
NITROSENZENE	763 PM	5.3	TO THE TENNESS OF THE STATE OF	E7:	
I BORHIRÓNE	BOL	1.3	BEVERSANTHEACENE	50L	€.3
I-NITE SEHENSI	201	5.3	CHAYBENE	£54	:.:
TO SETTING THE SET OF THE SET	251	4.3	EDE CHETHYLREADLAFRINALAFE	• •	1.1
E197010 4010	201	:	DI-W-GETYLFHIMA KIE	2.	6.1
Eit Fil-Chigsethga-" METHANE		2.3	BENZÓRE HELYCKANFHENF	211	: :
1.4-010HLOFOFHENDL	EDL	0.3	BENZIER IF LYGHANEHENE	: ::	
1.1 Trion of Services	EDL	Ç.3	BENZOCO FRANCIE	27/2	• •
AAF-THALENE	891	0.3	IDENBELLI, J-c. of PYPEAS	5 0.	1.
4-CHLORGANILIAE	201	<u></u>	DIBENIOUS ANTHRACENE	E01	
-EXACHLOROBUTADIENE	85.	9.3	BENZO! p.h.: PERVLENE	50.	• •
s-CHLORO-I-MEIHNLEHENOL	EDL	9.4			
2-METHYLNAFHTHALENE	SUL.	£.3	SURFOGATE STANDARDE RECOVER:	~	•
HEXACHLOROCYCLOPENTADIENE	BDL	6.2		RECOVER:	ACCEPTANTE LD C
S.4.6-TRICHLORGRHENCL	8:	0.3	×	: 4	
3.	8 01	1	C-FL-FHENOL	15	1 13:
2-CHLORONAPHTHALENE	80.	5.3	dt - FHENDL	1.	:0 - 4.
2-ATTROAMILINE	201	1	ALTROBENZENE-CE	٠	<u>.</u>
T DITETHILANTHALATE	5D1	5.3	2-FL-SIFFENYL	2:	47 - 144
ALEMATH THY ENT	201	8.3	TELEROMOPHENCL	2:	
2.5-DENETROTOLIENE	80.	9.3	TERPHENYL-61:	•.:	33
3-NITROANILINE	30L		Entranta Gre	•.•	
ACENAPHTHEME	EDL.	0.3			
1.4-BINITAGPHENGL	50L				
4-KITROFHENOL	801	•	*		
DISENSOFURAN	EDL EDL	£.3			•
1.6-DINITROTOLUENE	BDL -	4 - 7		:	
DIETHYLFHTHAL ATE	80F	9.3	th. Brian Spyratian		•
4-CHLOROPHENYL-PHENYLETMER		6.3	EDL = BELOW DETECTION LIMIT		.
FLUGRENE	EDL .	5.3	method reference: EFA SN 265. 2ND		
r m v = 11 m (7 m	£ĐL	0.3	METHOD ISSO/SIZ	·	* * .*

Laboratory Number: Sample Designation:		B-P102 Blank	
Date Analyzed:		8/13/8	
Matrix:		Solid	

PCB'S	· ·	CONCENTRATION (ug/g)	DETECTION LIMIT (ug/g)
	÷.		
PCB-1242		BDL	0.08
PCB-1254		BDL	0.16
	. •	BDL	0.08
PCB-1221	•		0.08
PCB-1232		BDL	
PCB-1248		BDL	0.08
	-	BDL	0.16
PCB-1260			0.08
PCB-1016		BDL	0,00

BDL = BELOW DETECTION LIMIT METHOD REFERENCE: EPA SW 846, 2N

EPA SW 846, 2ND EDITION METHODS 3540 AND 8080

SOIL MATRIX SPIKE

Date: 8/13/87

Sample Number: S-P102 (10,429-28 PCB Solid)

PCB SMO SAMPLE NO.	CONC. SPIRE ADDED (ug/g)	Sample Results (ug/g)	CONC. MS. (ug/g)	REC.
PCB 1254	1.3	.47	.60	48

RESOURCE ANALYSTS, INC. LABORATORY CONTROL SPIKE

LAB NUMBER 10429	DATE 8/12/87	SAMPLE DESIGNAT	ION WP780
COMPOUND	TRUE VALUE	ACCEPTANCE GUIDELINES	ACTUAL RECOVERY
Bis (2-Chloroisopropyl) ether	55	12.0 - 84.8	40
Bis (2-Chlororthyl) ether	20	4.3 - 29.1	9.
, Bis (2-chloroethoxy) methane	35	8.4 - 41.6	50
4-chlorophenyl-phenylether	40	5.2 - 64.4	23
4-Bromophenyl-phenylether	75	3.3 - 129	48

DATE 8/13/87 SAMPLE NUMBER 5-P102 (10,429-28)

PCB SMO SAMPLE NO.	CONC. SPIKE ADDED (ug/ g)	SAMPLE RESULT US/3.	CONC. MS. ug/g.	REC.
PCB 1254	1.3	.47	.60	48
				
	/h			
•				
			<u> </u>	

RESOURCE ANALYSTS, INC. LABORATORY CONTROL SPIKE

LAB NUMBER S-PIO3	CAMPLE DESIGNATION 10, 429-29 PCB SOLIO			
	DATE 8/13/87 S	WP-783	conc. 17	•
COMPOUND	TRUE VALUE	ACCEPTANCE GUIDELINES	ACTUAL RECOVERY	, •
Aroclor 1254	. 18 ng/g.	.07 - 24 ug/g	.19 ug/g.	

..ibrary used: Data file name:

SY: ACIDS SY: JL731H1

Injection time:

31-JUL-87 08: 52: 58

'ments:

ACID/SURR 50 STD.

Dilution factor:

1.00

, ibrary entries as follows:

Standards:

15 1.4-DICHLOROBENZENE-D4

25 NAPHTHALENE-D8

35 ACENAPHTHENE-D10

4S PHENANTHRENE D10

55 CHRYSENE D12

Targets:

1T PHENOL

2T 2-CHLOROPHENOL

3T 2-METHYLPHENOL

4T 4-METHYLPHENOL

5T 2,4-DIMETHYLPHENOL

6T 2-NITROPHENOL

7T BENZOIC ACID

BT 2,4-DICHLOROPHENOL

9T 4-CHLORO-3-METHYLPHENOL

10T 2.4.6-TRICHLOROPHENOL

11T 2,4,5-TRICHLOROPHENOL

12T 2,4-DINITROPHENOL

.3T 4-NITROPHENOL

14T 4,6-DINITRO-2-METHYLPHENOL

15T PENTACHLOROPHENOL

ACIDS
50 STD.
CONTINUING
CALIBRATION
CHECK
7-31-87

		•			•				
No.	Time	Scan	Tmass/Smass	Tarea/Sa	Brea	Ref	Fit	Conc	Units
15	8. 10	285		. .		STD	1. 00	40. 0	UG/L
25	11. 10	534				STD	0.76	40. 0	UG/L
38	15. 58	906				STD	1.00	40.0	UG/L
45	19. 35	1219				STD	0. 85	40. 0	
58	2 6. 3 2	1796	*		٠.	STD	0. 74	•	UG/L
17	7. 55	240	94. / 152.	42652. /	18539.	1		40.0	UG/L
2 T	7. 72	254	128. / 152.	31483. /		1	0. 93	50. 9	UG/L
3 T	8. 82	345	108. / 152.	28389. /	18539.	1	0. 96	48. 4	UG/L
4T	7. 18	375	107. / 152.		18539.	1	1.00	47. 4	UG/L
5T	10. 42	478	107. / 136.	36655./	18539.	1	1.00	48. 2	UG/L
6T	10. 23	463		28926. /	70413.	5	1.00	51. 1	UG/L
7T	11.05	530	139. / 136.	11342./	70413.	2	1.00	38. 7	UG/L
8T	10. B2		122. / 136.	11588. /	70413.	2	0. 94	43. 4	UG/L
9T		511	63. / 136.	13623. /	70413.	2	Q. 6 7	48. 2	UG/L
	12. 67		107. / 136.	20061./	70413.	2	1.00	37. 2	UG/L
10T	13. 70	750	198. / 164.	10077./	28946.	3	1.00	43. 2	UG/L
11T	13. 82	759	198. / 164.	10263. /	28946.	3	0. 93	44. 9	UG/L
12T	15. 90	933	184. / 164.	559. /	28946.	3	0. 77	6. B	UG/L
13T	16. 10	899	65. / 164.	3341./	28946.	. <u>3</u>	0.00	18.0	UG/L
14T	17. 28	1047	198. / 188.	1861./	41381.	4	0. 63	20.0	UG/L
4 3T	19. 10	1198	266. / 188.	3533. /	41381.		0. 77	2 6. 8	UG/L

	ÓE 05	1400	149. / 240.	26836. /	52368.	5	0. 96	34.6	UG/L
39T	25 . 05	1692	177. / ETU.	20030. /		_	= = = =		
40T	26. 30	1795	228. / 240.	31931./	52368.	5	0. 96	3 3. 0	UG/L
41T	26. 40	1804	228. / 240.	72047. /	52368 .	5	0. 93	5 3. 0	UG/L
42T	26. 60	1821	149. / 240.	45427. /	523 68.	5	0. 76	44. 5	UG/L
43T	28. 18	2068	149. / 264.	47261./	20734.	6	O. 85	31.0	UG/L
44T	29. 03	206B	252. / 264.	66526. /	20734.	6	0.00	107. 6	UG/L
45T	29, 25	2068	252. / 264.	66526. /	20734.	. 6	1.00	100.4	UG/L
46T	30. 02	2068	252. / 264.	21749./	20734.	6	0.00	56. 3	UG/L
47T	34. 35	206B	276. / 264.	B305. /	20734.	6	0.00	26. 5	UG/L
48T	34. 4B	2068	278. / 264.	4732. /	20734.	6	0.00	16. 0	UG/L
49T	35. 47	2068	276. / 264.	6350. /	20734.	6	0. 28	28. 1	UG/L
SOT	26. 28	1745	252. / 240.	3446. /	52368.	5	0.00	17. 2	UG/L
51T	23.00	1472	184. / 188.		96320 .	. 4	0.00	1. 1	UG/L

BASE/NOUT.
SO STO.
CONTINUING
CAUBINATION
CHECK
8-3-87

MATRIX SPIKE DUPLICATE RECOVERY

Laboratory Number: 10,429-1
Sample Designation: 2332-320 Fort Totten Soil #1
Date Analyzed: 8/3/87
Matrix: Soil

• ,	11 Nag. 1	,	REPLIC	ATÉ 1	REPLIC	ATE 2	RELATIV
COMPOUND	ug/g IN SAMPLE	ug/g SPIKE	ug/g FOUND	%REC- OVERY	ug/g FOUND	% REC- OVERY	RANGE %
1,1-DICHLOROETHENE TRICHLOROETHYLENE BENZENE TOLUENE CHLOROBENZENE	0 0 0 0	7 - 8 7 7	8 10 8 8	122 119 122 121 131	8 10 8 8	112 115 115 124 124	9 3 5 2 5

EPA SW 846, 2ND EDITION

ACTO/BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS

Laboratory Number:

Sample Designation:

10,429-2 2332-330 Fort Tosten Soil #:

Date Estracteo:

7/30/87

Date Analyzed:

2/3/27

Matria:

Soil

Results expressed on a dry (103 degrees C) basis.

Hoisture Content: 13.24

	-	CONCENTRATION	DETECTION LIMIT		CONSENTRATION	
		(ug/ç)	(uọ/g)		(nā/ā.	(uş/ş)
1	N-NITROSCOIMETHYLAMINE	BOL	0.2	E-NITROANILINE	80.	:
	PHENOL	501	0.3	4.5-DINITEQ-2-RETHYLPHENOL	3 51	:
	Bis (2-CHLORGETHYL ETHER)	BDL	0.3	N-NITROSODIFHENYLAMINE (1)	3 91	0.3
	2-CHLOROPHENGL	BD'L	0.3	4-EROMOPHENYL-PHENYLETHER	BUL	9.8
•	1.3-DICHLORGEENZENE	8DL	C.3	MEXACHLOROSENZENE	801	0.3
	1.4-DICHLORGEENZENE	801	0.3	PENTACHLOROPHENGL	80%	1
	RENZYL ALCOHOL	20L	0.3	PHENANTHRENE	80 Ú	9.8
	1.2-DICHLORGEENZERE	BD'	0.3	ANTHRACENE	EDL	0.3
	2-METHYLFHENOL	, EDL	0.3	DI-N-BUTYLPHTHALATE	801	9.2
	ELS (2-CHLOROISOPROFYL! ETHER	B5L	0.3	FLUORGANTHENE	BOL	2.3
	6-METHYLPHENCL	BDĽ	0.3	BENZIDENE	EDL	2
•	HEXACHLOROSTHÂNE	BDL	0.3	FYFENE	601	0.3
	N-MITROSODI-N-PROFYLAMINE	BDL	0.3	BUTYLBENIYLFHTHALATE	EDL	0.3
	NITROEENZENE	AP BDL	0.3	3.3'-DICHLOROBENZIDINE	80L	0.7.
	ISOPHORONE	30L	G. 2	BENZOLETANTHRACENE	EDL	Ç. 3
	2-NITROFHENOL	BDL	0.3	CHRYSENE	B0L	2.3
	2.4-DIMETHYLPHENOL	BDL	0.3	ELST2-ETHYLHEXYL FHTHALATE	0.7	0.3
	BENZOIC ACID	B DL	1	DI-N-OCTYLPHTHALATE	5 5L	0.3
•	Bis (2-CHLORETHOXY) HETHANE	BDL	0.3	BENZO(b)FLUORANTHENE	BOL	0.3
	2.4-DICHLOROPHENOL	BDL	0.3	BENZO(k)FLUOFANTHENE	BOL	6.3
	1.2,4-TRICHLOROBENZENE	8DL	0.3	BENZO(a PYRENE	BDL	0.3
ì	NAPHTHALENE	BDL	0.3	IDENO(1,2.3-c.d)PYRENE	BDL	0.3
	4-CHLOROANILINE	BOL	0.3	DIBENZO(B.h)ANTHRACENE	BDL	0,3
		BDL	Ç.3	BENZOLG.n.i)FERYLENE	BDL	0.3
	HEXACHLOROBUTADIENE	BDL	0.3	DENEST SIMILATE PROPERTY	•••	
ı	4-CHLORO-3-METMYLPHENOL	BOL	0.3	SURROGATE STANDARDS RECOVERY		•
	I-MITHYLNAPHTHALENI	EDL.	0.3	Johnson E Strangard account	RECOVERY	ACCEPTANCE LIMI
	HEXACHLOROCYCLOPENTACIENE	BÓL	0.3		[4]	(%)
•	2.4.5-TRICHECROPHENCE	BDL BDL	1	2-FL-PHENOL	12	21 - 195
	2.4.5-TRICHLOROPHENOL		0.3	d5-PHENOL	13	10 - 96
	2-CHLORONAPHTHALENE	BDL	0.5 1	NITROBENZENE-di	19	35 - 114
7	2-NITROANILINE	3DL	•	C-FL-EIPHENYL	21	43 - 11:
•	CIMETHYLPHTHALATE	BDL	0.3		33	15 - 123
	ACENAPHTHYLENE	EDL .	0.3	TRIBROMOPHENOL	. 41	32 - 16.
	2.:-DINITROTOLVENE	BDL	0.3	TERFHENYL-314		V 1V.
•	I-KITRGANILINE	BDL	1	•		
	ACENAPHTHENE	BDL	0.3	•		
	2,4-DINITROPHENOL	EDL	1			
:	4-NITROPHENOL	BDL	1			
	DIBENZOFURAN	BOL	0.3		•	•
	2.4-DINITROTOLUENÉ	801	0.3			
	DIETHYLPHTHALATE	BDL	0.3	EDL = SELOW DETECTION LIMIT		
	4-CHLOROPHENYL-PHENYLETHER	BDL	5.3	METHOD REFERENCE: EFA SU 545.		*
	FLUCRENE	EDL	0.3	METHOD 3550/	270	

ield Identification: 2332-341 FT Sediment #1 Jaboratory Number: 10,430-2 Matrix: Solid

Market and the second of the s	Date	ी के जिल्ला अस्ति हैं।	and the second s
.arameter	Analyzed	Method/Reference	Concentration
ilver, recoverable (ug/g) rsenic, recoverable (ug/g) Barium, recoverable (ug/g) radmium, recoverable (ug/g) hromium, recoverable (ug/g) mercury, recoverable (ug/g) Lead, recoverable (ug/g)	7/29/87 8/12/87 7/29/87 7/29/87 7/29/87 7/29/87	6010/1 7060/1 6010/1 6010/1 6010/1 7471/1 6010/1	<1 4.9 <10 <0.5 13 0.27 210 <1
Lead, recoverable (ug/g) lelenium, recoverable (ug/g)	8/14/87	7740/1	<1

Tield Identification: 2332-342 FT Sediment #2
aboratory Number: 10,430-5 Matrix: Solid

arameter	Date Analyzed	Method/Reference	Concentration
Silver, recoverable (ug/g) Arsenic, recoverable (ug/g) Barium, recoverable (ug/g) Cadmium, recoverable (ug/g) Chromium, recoverable (ug/g) Arcury, recoverable (ug/g) Lead, recoverable (ug/g) Selenium, recoverable (ug/g)	7/29/87	6010/1	<1
	8/12/87	7060/1	5.0
	7/29/87	6010/1	18
	7/29/87	6010/1	<0.5
	7/29/87	6010/1	19
	7/29/87	7471/1	0.20
	7/29/87	6010/1	225
	8/14/87	7740/1	<1

Matrix: Solid Field Identification: 2332-343 FT Sediment #3 Laboratory Number: 10,430-8

Parameter	Date Analyzed	Method/Reference	Concentration
Silver, recoverable (ug/g) Arsenic, recoverable (ug/g) Barium, recoverable (ug/g) Cadmium, recoverable (ug/g) Chromium, recoverable (ug/g) -Mercury, recoverable (ug/g) Lead, recoverable (ug/g) Selenium, recoverable (ug/g)	7/29/87	6010/1	<1
	8/12/87	7060/1	2.8
	7/29/87	6010/1	<10
	7/29/87	6010/1	<0.5
	7/29/87	6010/1	12
	7/29/87	7471/1	0.15
	7/29/87	6010/1	270
	8/14/87	7740/1	<1

Field Identification: 2332-344 FT Sediment #4
Laboratory Number: 10,430-11 Matrix: Solid

	. Date	and the second second	
Parameter	Analyzed	Method/Reference	Concentration
Silver, recoverable (ug/g)	7/29/87	6010/1	<2
Arsenic, recoverable (ug/g)	8/12/87	7060/1	4.6
Barium, recoverable (ug/g)	7/29/87	6010/1	27
Cadmium, recoverable (ug/g)	7/29/87	6010/1	<0.6
Chromium, recoverable (ug/g)	7/29/87	6010/1	14
Mercury, recoverable (ug/g)	7/29/87	7471/1	0.28
Lead, recoverable (ug/g)	7/29/87	6010/1	190
Selenium, recoverable (ug/g)	8/14/87	7740/1	<1

Field Identification: 2332-346 FT Sed Samp Blk Laboratory Number: 10,430-13 Matrix: Water

Parameter	Date Analyzed	Method/Reference	Concentration
Silver, recoverable (mg/L)	7/29/87	6010/1	<0.01
Arsenic, recoverable (mg/L)	8/12/87	7060/1	<0.01
Barium, recoverable (mg/L)	7/29/87	6010/1	<0.1
Cadmium, recoverable (mg/L)	7/29/87	6010/1	<0.005
Chromium, recoverable (mg/L)	7/29/87	6010/1	<0.01
Mercury, recoverable (mg/L)	7/29/87	7470/1	<0.0005
Lead, recoverable (mg/L)	7/29/87	7421/1	<0.005
Selenium, recoverable (mg/L)	8/14/87	7740/1	<0.01

References: 1) EPA SW 846, 2nd Edition

CALIBRATION VERIFICATION

Lab Number: 10430

Site: Fort Totten

Units: mg/L

METALS:

. .	True Value	Found	<u>RR</u>	Method
Arsenic	0.050	0.048	96	7060
Barium	20.0	20.0	100	7080
Cadmium	0.50	0.492	98	7130
Chromium	1.0	0.985	98.5	7190
Lead	10.0	10.0	100	7420
Mercury	0.0050	0.00515	103	7470
Selenium	· 0.050	0.049	99	7740
Silver	1.0	0.998	99.8	7760

CALIBRATION VERIFICATION SOURCES

Dilution of Commercial AA Standard unless otherwise specified.

¹⁾ Control Limits: Mercury and Tin 80-120; Other Metals 90-110
2) Indicate Analytical Method Used: P-ICP; A-Flame AA; F-Furnace AA

QUALITY ASSURANCE/QUALITY CONTROL

MERCURY

	· · · · · · · · · · · · · · · · · · ·			
1. Blank Data				
Blank Number	Results <u>(ug/g)</u>	· -		manage of the stat
HgB 68	<0.05			
2. Accuracy				
			Total	
	Original	andles I small	Concentrati	
Sample Field I.D.	Concentration (ug/g)	Spike Level <u>(ug/g)</u>	Found (ug/g)	Recovery
1 10430-8 2332-343	0.15	0.99	1.18	104
3. Precision				
,	Replicate 1	Replicate 2	Average	% Relative
Sample Field I.D.	(ug/g)	(ug/g)	<u>(na\a)</u>	Range
10430-8 2332-343	0.14	0.16	0.15	13
	<u>.</u>			
	e e			
		SILVER		·
	<i>1</i> %			
1. Blank Data		·		
Blank Number	Results (ug/g)			
DIBIN NUMBEL	<u> 1497.97</u>			
MB 366	<0.5			
2. Accuracy		·		
	A!! 9		Total	
	Original Concentration	Spike Level	Concentrati Found	on k
Sample Field I.D.	(na/a)	(na/a)	(na/a)	Recovery
10429-3 2332-320 10429-21 2332-326	<1 <1	7.2 6.0	7.0 5.8	97 97
3. Precision		·		
Sample Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
10429-3 2332-320	<1	<1	<1	NC
10429-21 2332-326	<1	<1	<1	NC

ARSENIC

1. Blank Data	Results			•
Blank Number	(na/a)		and the second s	,
MB 366	<1			
2. Accuracy Sample Field I.D.	Original Concentration (ug/g)	Spike Level (ug/g)	Total Concentration Found (ug/g)	k Recovery
10429-3 2332-320 10429-21 2332-326	19 20	7.2 6.0	22.5 22.8	49 47
3. Precision		ere en en en en en en en en en en en en en	**.	•
Sample Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
10429-3 2332-320 10429-21 2332-326	20 21	18 19	19 20	10.5 10
	,	BARIUM		
1. Blank Data Blank Number	Results (ug/g)			
MB 366	<10			
2. Accuracy				
Sample Field I.D.	Original Concentration (ug/g)	Spike Level (ug/g)	Total Concentration Found (ug/g)	% Recovery
10429-3 2332-320 10429-21 2332-326	94 5	724 602	757 617	91 102
3. Precision	•		•	•
Sample Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
10429-3 2332-320 10429-21 2332 326	93 58	95 56	94 57	2 3.5

CADMIUM

	*		 n.e	
1. Blank Data		# -		** 9
Blank Number	Results (ug/g)	i i		A desired and the second and the sec
MB 366	<0.5		•	
2. Accuracy		•.		
Sample Field I.D.	Original Concentration (ug/g)	Spike Level (ug/g)	Total Concentration Found (ug/g)	% Recovery
10429-3 2332-320 10429-21 2332-326	0.72 <0.6	72 60.2	71 55	98 90
3. Precision		. mater		
Sample Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative, Range
10429-3 2332-320 10429-21 2332-326	0.69 ⁻ <0.6	0.74	0.72 <0.6	6.9 NC
	e de la companya del companya de la companya del companya de la co		* e .	
	the state of the s	CHROMIUM		
1. Blank Data	Results			
Blank Number	<u>(ug/g)</u>			
MB 366	<1			
2. Accuracy			Total	
Sample Field I.D.	Original Concentration (ug/g)	Spike Level (ug/g)	Concentration Found (ug/g)	Recovery
10429-3 2332-320 10429-21 2332-326	39 27	725 602	796 640	104 102
3. Precision		•	,	*
Sample Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
10429-3 2332-320 10429-21 2332-326	38 26	39 27	39 27	2.6 3.7

1. Blank Data	•	· •		
Blank Number	Results (mg/L)	*		Programme Action (A)
MB 367	<0.1			
2. Accuracy				
Sample Field I.D.	Original Concentration (mg/L)	Spike Level (mg/L)	Total Concentration Found (mg/L)	* Recovery
10465-3 2332-301	0.2	5.0	4.94	95
3. Precision			e e e e e e e e e e e e e e e e e e e	*
Sample Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Relative Range
10465-3 2332-301	0.1	0.2	0.2	50
• * * * *	en en en en en en en en en en en en en e	CHROMIUM	enter enter enter enter enter enter enter enter enter enter enter enter enter enter enter enter enter enter en	ent et in de
1. Blank Data				
Blank Number	Results (mg/L)			
MB 367	<0.01			
2. Accuracy Sample Field I.D.	Original Concentration (mg/L)	Spike Level (mg/L)	Total Concentration Found (mg/L)	\$ Recovery
10465-3 2332-301	0.031	5.0	5.4	107
3. Precision				. *
Sample Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Relative <u>Range</u>

0.031

1. Blank Data	D 3 4 -			
Blank Number	Results (mg/L)			
MB 367	<0.1	.		territaria de
2. Accuracy			Total	
Sample Field I.D.	Original Concentration (mg/L)	Spike Level (mg/L)	Concentrati Found (mg/L)	on % <u>Recovery</u>
10465-3 2332-301	<0.1	5.0	4.97	99
3. Precision				
Sample Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	% Relative <u>Range</u>
10465-3 2332-301	<0.1	<0.1	<0.1	NC
NC = not calculable	due to results	below detecti	on limit.	
0.0 0.00 0.000	• '			
		SELENIUM		•
1. Blank Data		•	en.	
1. Blank Data	Results (mg/L)	•	daniero (
1. Blank Data	Results	•		
1. Blank Data Blank Number	Results (mg/L)	•		
1. Blank Data Blank Number MB 367	Results (mg/L)	SELENIUM	Total Concentrati Found (mg/L)	on * Recovery
1. Blank Data Blank Number MB 367 2. Accuracy	Results (mg/L) <0.01 Original Concentration (mg/L)	SELENIUM Spike Level	Total Concentrati Found	*
 Blank Data Blank Number MB 367 Accuracy Sample Field I.D. 	Results (mg/L) <0.01 Original Concentration (mg/L)	Spike Level	Total Concentrati Found (mg/L)	Recovery 22
1. Blank Data Blank Number MB 367 2. Accuracy Sample Field I.D. 10465-3 2332-301	Results (mg/L) <0.01 Original Concentration (mg/L)	Spike Level	Total Concentrati Found (mg/L) 0.0111	Recovery

SILVER

1. Blank Data	Results	τ_{j}	40	
Blank Number	(mg/L)	1		
MB 367	<0.02			
2. Accuracy		:	•	•
Z. Accuracy			Total	
	Original		Concentration)n
	Concentration	Spike Level	Found (mg/L)	Recovery
Sample Field I.D.	(mg/L)	(mg/L)	(mg/L)	RECOVELY
10465-3 2332-301	<0.01	0.05	0.053	106
	•		•	
• • •				
3. Precision		•	•	*
	Replicate 1	Replicate 2	Average	Relative
Sample Field I.D.	(mg/L)	(mg/L)	(mg/L)	Range
	•			
10465-3 2332-301	<0.01	<0.01	<0.01	NC .
•				
	•	CADMIUM		
		<u></u>		
1. Blank Data	•			
•	Results			
Blank Number	(mg/L)	the special		
MB 367	<0.005			
		•		
2. Accuracy				
	- • • •		Total	
·	Original	Spike Level	Concentration Found)n k
	Concentration (mg/L)	(mg/L)	(mg/L)	Recovery
Sample Field I.D.	7 m Q / 12 /	7mg/2/	7444 21	
10465-3 2332-301	<0.005	0.5	0.477	94
Description				
3. Precision		•	• •	\$.
	Replicate 1	Replicate 2	Average	Relative
Sample Field I.D.	(mg/L)	(mg/L)	(mg/L)	Range
			40 00E	NC
10465-3 2332-301	<0.005	<0.005	<0.005	NC
	•			•

NC = Not calculable due to result below detection limit.

SELENIUM

1.	Blan	k Data	<u> </u>			
	Blan	k Number	Results (ug/g)			
	MB 3	66	<1	·		•
2.	Accu	racy	·			
Sam	ple	Field I.D.	Original Concentration (ug/g)	Spike Level (ug/g)	Total Concentration Found (ug/g)	* Recovery
	29-3 29- 2 1	2332-320- 2332-326	<1 <1	7.2 6.0	4.1 2.6	57 43
3.	Prec	ision				
Sam	ple	Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
	29-3 29-21	2332-320 2332-326	<1 <1	<1 <1	<1 <1	NC NC
NC	= No	t calculable	due to result	below detecti	on limit.	
			75 <u>.</u>			
				LEAD		
1.	Blan	k Data	Results			
	Blan	k Number	<u>(ua/a)</u>	•		
	MB 3	66	<1	•		
2.	Accu	racy				
Sam	ple	Field I.D.	Original Concentration (ug/g)	Spike Level (ug/g)	Total Concentration Found (ug/g)	% Recovery
		2332-320 2332-326	40 45	724 602	684 578	8 9 89
3.	Prec	ision	Z. www.			•
Sam	ple	Pield I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range

10429-3 2332-320 10429-21 2332-326

ARSENIC

				, , , ,	
1.	Blank Data	Results	·		
	Blank Number	(mg/L)			
	MB 367	<0.01			
2.	Accuracy	•			
-	ple Field I.D.	Original Concentration (mg/L)	Spike Level (mg/L)	Total Concentration Found (mg/L)	% Recovery
, 104	65-3 2332-301	<0.1	0.05	0.0427	85
3.	Precision				•
Sam	ple Field I.D.	Replicate 1 (mg/L)	Replicate 2 (mg/L)	Average (mg/L)	Relative Range
104	65-3 2332-301	<0.01	<0.01	<0.01	NC
NC	= Not calculable	due to result !	below detection	n limit.	
		•	MERCURY	y •	and the second of the second o
1.	Blank Data	Results			
	Blank Number	(mg/L)	•		
	MB 367	<0.0005		•	·
2.	Accuracy	Original Concentration (mg/L)	Spike Level (mg/L)	Total Concentration Found (mg/L)	k Recovery
	rield I.D. 165-3 2332-301	<u>√//</u> <0.0005	4	0.00755	76
3. Sai	Precision	Replicate 1 (mg/L)	Replicate 2	Average (mg/L)	% Relative <u>Range</u>
	165-3 2332-301	<0.0005	<0.0005	<0.0005	NC

QC DATA FOR PESTICIDES

1. Laboratory Control Sample

<u>I. D.</u>	True Value (ug/g)	e	Found (ug/g)	Recovery	Acceptance Limits
S-P105	Lindane	0.2	0.12	61	56 - 123
	Heptachlor	0.2	0.096	48	40 - 131
	Aldrin	0.2	0.11	57	40 - 120
	Dieldrin	0.5	0.27	54	52 - 126
	Endrin	0.5	0.26	51	56 - 121
	DDT	0.5	0.14	27	32 - 127

2. Blank

Blank Number

B 107 No compounds detected.

3. Mid-Range Calibration - Check

Standard Compound	(True) Calibration Value 8-5-87 (ug/mL)	Calibration Value 8-6-87 (ug/mL)	% Recovery
Lindane	0.025	0.020	79
Heptachlor	.050	.034	68
Aldrin	.050	.041	82
Heptachlor epoxide	.050	.041	82
Endosulfan 1	.10	.075	75
Dieldrin	.050	.040	80
Endosulfan 2	.050	.038	76
Endrin Aldehyde	.125	.089	71
DDT	.10	.028	(100)
Methoxychlor	.50	.19	38
alpha BHC	.025	.023	92
beta BHC	.050	.043	86
delta BHC	.050	.044	88
aldrin	.050	.041	82
DDE	.050	.041	82
endrin	.050	.041	82
DDD	.10	.081	81
endosulfan sulfate	.10	.080	80
endrin ketone	.10	.073	73

::•

4. Precision

Wipes were unable to be subsampled for precision assesment.

5. Accuracy

Wipes were unable to be subsampled for accuracy assesment.

QC DATA FOR PETROLEUM HYDROCAKBUNS

1.	Laboratory Contro	ol Sample True Value	. Fou	nd	Recovery
	<u>I. D.</u>	(mg/L)	(ma	<u>/L)</u>	-
	S-15 SD-13	5.04 5.04	5. 5.	-	99 107
2.	Mid Range Calibr	ation Check Sam	nple	÷	
	True Value (mg/L)	Found (mg/L)	Re	covery (%)	
	50	53	•	106	
3.	Blank		*		•
	Blank Number	Results	3		
	261 260	<60 ug/			
4.	Precision				*
Sam	ple Field I.D.	Replicate 1 (ug/g)	Replicate 2 (ug/g)	Average (ug/g)	Relative Range
104	39-9 2332-343	190	150	170	24
5.	Accuracy			Total	
		Original		Concentra	
San	pple Field I.D.	Concentration (ug/g)	Spike Level (ug/g)	Found (ug/g)	•
	130-3 2332-341 130-11 2332-344	220 280	320 630	710 6 60	156 60

Matrix: Solid Analysis: Petroleum Hydrocarbons (ug/g)

Method/Reference: 503B,D,E/Standard Methods, 16th Edition

Date Analyzed: August 4, 1987

Concentration Field Identification Lab. No. 10,430-3 220 2332-341 FT Sediment #1 280 10,430-6 2332-342 FT Sediment #2 10,438-9 150 2332-343 FT Sediment #3 280 2332-344 FT Sediment #4 10.430-11

The same standards

Analysis: Petroleum Hydrocarbons (ug/g)
Method/Reference: 503B,D,E/Standard Methods, 16th Edition Matrix:

Date Analyzed: August 4, 1987

Field Identification	Lab. No.	Concentration
2332-346 FT Sed Sam Blk	10,430-14	<1.0

Lab Number: Sample Designation:

Date Analyzed:

Matrix:

10,430-1 2332-341 FT Sediment #1

8/04/87 Solid

VOLATILE ORGANICS	CONCENTRATION (ug/g)	DETECTION LIMIT (ug/g)
CHLOROMETHANE	BDL	1
VINYL CHLORIDE	BDL	1
CHLOROETHANE	BDL	0.5
BROMOMETHANE	BDL	1 .
METHYLENE CHLORIDE	BDL	0.5
1,1-DICHLOROETHYLENE	BDL	0.5
1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE	BDL	0.5
CHLOROFORM	BDL	0.5
1,2-DICHLOROETHANE	BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE	BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	0.5
DIBROMOCHLOROMETHANE	BDL	0.5
BROMOFORM	BDL	0.5
TETRACHLOROETHYLENE	BDL	0.5
1,1,2,2-TETRACHLOROETHANE	BDL	0.5
TOLUENE	BDL	0.5
CHLOROBENZENE	BDL	0.5 0.5
ETHYLBENZENE	BDL	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBK	BDL	2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
SURROGATE STANDARDS RECOVERY	,	
	RECOVERY	ACCEPTANCE LIMITS

(\$)

87

89

81

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: EPA SW 846, 2ND EDITION
METHOD 8240

d4-dichloroethane

BROMOFLUOROBENZENE

d8-Toluene

Resource Analysts, Incorporated

(\$)

70 - 121 81 - 117

74 - 121

10,430-4 2332-342 FT Sediment #2 8/04/87 Solid

Matrix:

VOLATILE ORGANICS	CONCENTRATION (ug/g)	DETECTION LIMIT (UG/G)
CHLOROMETHANE	BDL	1
VINYL CHLORIDE	BDL	ī
CHLOROETHANE	BDL	0.5
BROMOMETHANE	BDL	1
METHYLENE CHLORIDE	BDL	0.5
1,1-DICHLOROETHYLENE	BDL	0.5
1,1-DICHLOROETHYLENE 1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE	BDL	0.5
CHLOROFORM	BDL	0.5
1,2-DICHLOROETHANE	BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE	- BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BĎL	0.5
DIBROMOCHLOROMETHANE	BDL	0.5
Bromoform Tetrachloroethylene	BDL	0.5
	BDL	. 0.5
1,1,2,2-TETRACHLOROETHANE	BDL	0.5
Toluene	BDL	
CHLOROBENZENE	BDL	0.5
BTHYLBENZENE	BDL	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	_ BDL	0.5
THF	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBR	BDL	·· 2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
· · · · · · · · · · · · · · · · · · ·		

SURROGATE STANDARDS RECOVERY

TOURS DIMINING RECOVER	RECOVERY	ACCEPTANCE LIMITS
d4-dichloroethane	84	70 - 121
d8-toluene	84	81 - 117
Bromofluorobenzene	83	74 - 121

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: EPA SW 846, 2ND EDITION
METHOD 8240

2332-343 PT Sediment #3 8/04/87 Solid

10,430-7

Matrix:

VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT (ug/g)
CHLOROMETHANE	(ug/g) BDL	1
VINYL CHLORIDE	BDL	ĭ
CHLOROETHANE	BDL	0.5
BROMOMETHANE	BDL	1
METHYLENE CHLORIDE	BDL	0.5
1,1-DICHLOROETHYLENE	BDL	0.5
1,1-DICHLOROETHANE	BDL	0.5
1.2-trans-DICHLOROETHYLENE	BDL	0.5
CHLOROFORM	BDL	0.5
1,2-DICHLOROETHANE	, BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE	BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-Dichloropropene	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	0.5
DIBROMOCHLOROMETHANE	BDL	0.5
BROMOFORM	BDL	0.5
BROMOFORM TETRACHLOROETHYLENE	BDL	· 0.5
1,1,2,2-TETRACHLOROETHANE	BDL	0.5
TOLUENE	BDL	0.5
CHLOROBENZENE	BDL.	0.5
ETHYLBENZENE	BDL	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MER	BDL	2.5
VINYL ACETATE	BDL	1
MIBK	BDL	2.5
2-hexanone	BDL	2.5
styrene	BDL	0.5
XYLENES	BDL	0.5
SURROGATE STANDARDS RECOVERY		
	RECOVERY	ACCEPTANCE LIMITS

BDL = BELOW DETECTION LIMIT METHOD REFERENCE: EPA SW 846, 2ND EDITION

d4-DICHLOROETHANE

BROMOFLUOROBENZENE

d8-TOLUENE

METHOD 8240

(4)

86

90

80

Resource Analysts, Incorporated

(%)

70 - 121

81 - 117

74 - 121

10,430-10 2332-344 FT Sediment #4 8/04/87 Solid

Matrix:

VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
VOINTER VIVILIEU	(ug/g)	(ug/g)
CHLOROMETHANE	BDL	1
VINYL CHLORIDE	BDL	1
CHLOROETHANE	BDL	0.5
BROMOMETHANE	BDL	1
METHYLENE CHLORIDE	BDL	0.5
1,1-DICHLOROETHYLENE	BDL	0.5
1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE	BDL	0.5
CHLOROFORM	BDL	0.5
1.2-DICHLOROETHANE	BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE -	BDL	0.5
1,2-DICHLOROPROPANE	BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	0.5
DIBROMOCHLOROMETHANE	BDL	0.5
BROMOFORM	BDL	0.5
TETRACHLOROETHYLENE	BDL	0.5
1,1,2,2-TETRACHLOROETHANE	BDL	0.5
TOLUENE	BDL	0.5
CHLOROBENZENE	BDL	0.5
ETHYLBENZENE	BDL	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBK	BDL	2.5
2-HEXANONE	BDL	2.5
STYRENE	BDL	0.5
XYLENES	BDL	0.5
SURROGATE STANDARDS RECOVERY		
SURROUATE STANDARDS RECOVERS	RECOVERY	ACCEPTANCE LIMITS
	YOU'S	WACELIVING REWITS

	RECOVERY (%)	ACCEPTANCE LIMITS (%)
d4-DICHLOROETHANE	98	70 - 121
d8-Toluene	90	81 - 117
BROMOFLUOROBENZENE	78	74 - 121

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: EPA SW 846, 2ND EDITION
METHOD 8240

Lab Number:

Sample Designation:

Date Analyzed:

Matrix:

10,430-12

2332-346 FT Sed Sam Blk

8/04/87

Water

	VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
		(ug/L)	(ug/L)
	CHLOROMETHANE	BDL	10
	VINYL CHLORIDE	BDL	10
	CHLOROETHANE	BDL	. 5
	BROMOMETHANE	BDL	. 5
	METHYLENE CHLORIDE	BDL	5
	1,1-DICHLOROETHYLENE	BDL	5
	1,1-DICHLOROETHYLENE 1,1-DICHLOROETHANE	BDL	5
	1,2-trans-DICHLOROETHYLENE	BDL	5
	CHLOROFORM	BDL	
٠,	1,2-DICHLOROETHANE	BDL	5
i	1,1,1-TRICHLOROETHANE	BDL	5
'	CARBON TETRACHLORIDE	BDL	5 5 5 5
	BROMODICHLOROMETHANE	BDL	5
	1,2-DICHLOROPROPANE	BDL	5
	1,3-trans-DICHLOROPROPENE	BDL	5
	TRICHLOROETHYLENE	BDL	5
٠,	BENZENE	BDL	5
	1,3-cis-DICHLOROPROPENE	BDL	5
	1,1,2-TRICHLOROETHANE	BDL	5
	2-CHLOROETHYL VINYL ETHER	BDL	5
	DIBROMOCHLOROMETHANE	BDL	5
	BROMOFORM	BDL	5
	TETRACHLOROETHYLENE	BDL	5
	1,1,2,2-TETRACHLOROETHANE	BDL	5
	TOLUENE	BDL	. 5 5
	CHLOROBENZENE	BDL	5
	ETHYLBENZENE	BDL	5
		223	3
	ACETONE	BDL	25
	CARBON DISULFIDE	BDL	5
	THF	BDL	25
	MEK	BDL	25
•	VINYL ACETATE	BDL	10
	MIBK	BDL	25
	2-HEXANONE	BDL	25
	STYRENE	BDL	. 25 5
	XYLENES	BDL	5 5
•			.
	CITA DAGS CO. CO. CO. CO. CO. CO. CO. CO. CO. CO.	÷	

SURROGATE STANDARDS RECOVERY

TANKANIA PIWIDWAD VECAME!		
	RECOVERY	ACCEPTANCE LIMITS
9.4	(%)	(%)
d4-dichloroethane	90	76 - 114
d8-Toluene	100	88 - 110
Bromofluorobenzene	83	86 - 115

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: EPA SW 846, 2ND EDITION

METHOD 8240

Lab Number:

Sample Designation: Date Analyzed:

Matrix:

10,430-15 2332-348 FT Sed Trav Blk

8/04/87

Water ...

	TOLEMAN B ODCINICS	CONCRN	TRATION	
	VOLATILE ORGANICS	REP. 1		DETECTION LIMIT
		(ug/L)		(ug/L)
	CHLOROMETHANE	BDL	BDL .	10
٠	VINYL CHLORIDE	BDL	BDL .	10
	CHLOROETHANE	BDL	BDL	5
	BROMOMETHANE	BDL	BDL	5
	METHYLENE CHLORIDE	BDL	BDL .	5
	1,1-DICHLOROETHYLENE	BDL	BDL	5
	1,1-DICHLOROETHANE	BDL	BDL :	. 5
	1,2-trans-DICHLOROETHYLENE	BDL	BDL	5
	CHLOROFORM	BDL	BDL	· 5
	1,2-DICHLOROETHANE	BDL	BDL	5 %
	1,1,1-TRICHLOROETHANE	BDL	BDL	5
		BDL	BDL	5
	CARBON TETRACHLORIDE BROMODICHLOROMETHANE	BDL	BDL	Ę
		BDL	BDL	5 5
	1,2-DICHLOROPROPANE	BDL	BDL	. 5
	1,3-trans-DICHLOROPROPENE	BDL	BDL	5
	TRICHLOROETHYLENE	BDL	BDL	Ĕ.
	BENZENE	BDL	BDL	5
	1,3-cis-DICHLOROPROPENE	BDL	BDL	5
	1,1,2-TRICHLOROETHANE	BDL		5
	2-CHLOROETHYL VINYL ETHER	BDL	BDL	5
	DIBROMOCHLOROMETHANE	BDL	BDL	. 5
	BROMOFORM	BDL	BDL	5
	TETRACHLOROETHYLENE	BDL	BDL	5
	1,1,2,2-TETRACHLOROETHANE			5
	TOLUENE	BDL	BDL ·	5
	CHLOROBENZENE	BDL BDL	BDL	. 5
	ETHYLBENZENE	PDF	PAR	9
	ACETONE	BDL	BDL	25
	CARBON DISULFIDE	BDL	BDL	5
	THF	BDL	BDL	25
	MEK	BDL	BDL.	25
	VINYL ACETATE	BDL	BDL	10****
	MIBK	BDL	BDL	25
	2-HEXANONE	BDL	BDL	25
	STYRENE	BDL	BDL	5
	XYLENES	BDL	BDL	5
	SURROGATE STANDARDS RECOVERY		٠.	٠.
		REP. 1	REP. 2	ACCEPTANCE LIMITS
		(%)	(%)	(%)
	d4-dichloroethane	92	92	70 - 121
	d8-Toluene	96	94	81 - 117
	Bromofluorobenzene	85	83	74 - 121

BDL = BELOW DETECTION LIMIT METHOD REFERENCE: EPA SW 846, 2ND EDITION METHOD 8240

10,430-16 2332-350 Fort Totten Wipe #1 8/07/87 Solid

PESTICIDES	CONCENTRATION (ug/wipe)	DETECTION LIMIT (ug/wipe)
ALDRIN	BDL	0.005
ALPHA-BHC	BDL	0.005
- BETA-BHC	BDL	0.005
GAMMA-BHC	BDL	0.005
DELTA-BHC	BDL	0.005
CHLORDANE	BDL	0.05
4,4'-DDT	4.2	0.01
4,4'-DDE	1.1	0.01
4,4'-DDD	0.69	0.01
DIELDRIN	BDL	0.01
ENDOSULFAN I	BDL	0.005
ENDOSULFAN II	BDL	0.01
ENDOSULFAN SULFATE	BDL	0.01
ENDRIN	BDL	0.01
ENDRIN ALDEHYDE	BDL	0.01
HEPTACHLOR	BDL	0.005
HEPTACHLOR EPOXIDE	BDL	0.005
TOXAPHENE	BDL	10
ENDRIN KETONE	BDL	0.01
METHOXYCHLOR	BDL	0.05

BDL = BELOW DETECTION LIMIT METHOD REFERENCE: 40 CFR PART 136, FRIDAY, OCTOBER 26, 1984 METHOD 608

^{*} Pesticide identification is tentative. GC confirmation is needed for positive identification.

10,430-17 2332-351 Fort Totten Wipe #2 8/07/87 Solid

PESTICIDES	CONCENTRATION (ug/wipe)	DETECTION LIMIT (ug/wipe)
ALDRIN	BDL	0.005
ALPHA-BHC	BDL	0.005
BETA-BHC	BDL	0.005
GAMMA-BHC	BDL	0.005
DELTA-BHC	BDL	0.005
CHLORDANE	BDL	0.05
4,4'-DDT	1.7	0.01
4,4'-DDE	0.29	0.01
4,4'-DDD	0.42	0.01
DIELDRIN	BDL	0.01
ENDOSULFAN I	BDL	•
		0.005
,	BDL	0.01
ENDOSULFAN SULFATE	BDL	0.01
ENDRIN	BDL	0.01
ENDRIN ALDEHYDE	BDL	0.01
HEPTACHLOR	BDL	0.005
HEPTACHLOR EPOXIDE	BDL	0.005
TOXAPHENE	BDL	10
ENDRIN KETONE	BDL	0.01
METHOXYCHLOR	BDL	0.05

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: 40 CFR PART 136, FRIDAY, OCTOBER 26, 1984
METHOD 608

^{*} Pesticide identification is tentative. GC confirmation is needed for positive identification.

Laboratory Number: Sample Designation:

Date Analyzed: Matrix:

10,430-18

2332-352 Fort Totten Wipe #3

8/07/87

Solid

PESTICIDES	CONCENTRATION (ug/wipe)	DETECTION LIMIT (ug/wipe)
ALDRIN	BDL	0.005
ALPHA-BHC	BDL	0.005
BETA-BHC	BDL	0.005
GAMMA-BHC	BDL	0.005
DELTA-BHC	BDL	0.005
CHLORDANE	BDL °	0.05
4,4'-DDT	3.2	0.01
4,4'-DDE	0.05	0.01
4,4'-DDD	0.53	0.01
DIELDRIN	BDL	0.01
ENDOSULFAN I	BDL	0.005
ENDOSULFAN II	BDL	0.01
ENDOSULFAN SULFATE	BDL	0.01
ENDRIN	BDL	0.01
ENDRIN ALDEHYDE	BDL	0.01
HEPTACHLOR	BDL	0.005
HEPTACHLOR EPOXIDE	BDL	0.005
TOXAPHENE	BDL	. 10
ENDRIN KETONE	BDL	0.01
METHOXYCHLOR	BDL	0.05

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: 40 CFR PART 136, FRIDAY, OCTOBER 26, 1984 METHOD 608

^{*} Pesticide identification is tentative. GC confirmation is needed for positive identification.

10,430=19 2332-353 Fort Totten Wipe #4 8/07/87 Solid

PESTICIDES	CONCENTRATION (ug/wipe)	DETECTION LIMIT (ug/wipe)
ALDRIN	BDL	0.005
ALPHA-BHC	BDL	0.005
BETA-BHC	BDL	0.005
GAMMA-BHC	BDL	0.005
DELTA-BHC	BDL	0.005
CHLORDANE	BDL	0.05
4,4'-DDT	4.1	0.01
4,4'-DDE	0.2	0.01
4,4'-DDD	0.8	0.01
DIELDRIN	BDL	0.01
ENDOSULFAN I	BDL	0.005
ENDOSULFAN II	BDL	0.01
ENDOSULFAN SULFATE	BDL	0.01
ENDOSODFAN SODFATE	BDL	0.01
ENDRIN ALDEHYDE	BDL	0.01
• • • • • • • • • • • • • • • • • • •	BDL	0.005
HEPTACHLOR		
HEPTACHLOR EPOXIDE	BDL	0.005
TOXAPHENE	BDL	10
ENDRIN RETONE	BDL	0.01
METHOXYCHLOR	BDL	0.05

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: 40 CFR PART 136, FRIDAY, OCTOBER 26, 1984
METHOD 608

* Pesticide identification is tentative. GC confirmation is needed for positive identification.

10,430-20 2332-354 Fort Totten Wipe #5 8/07/87 Solid

PESTICIDES	CONCENTRATION (ug/wipe)	DETECTION LIMIT (ug/wipe)
ALDRIN	BDL	0.005
ALPHA-BHC -	BDL	. 0.005
BETA-BHC	BDL	0.005
GAMMA-BHC	BDL	0.005
DELTA-BHC	BDL	0.005
CHLORDANE	BDL	0.05
4,4'-DDT	2.3	0.01
4,4'-DDE	.72	0.01
4.4'-DDD	.60	0.01
DIELDRIN	BDL	0.01
ENDOSULFAN I	BDL	0.005
ENDOSULFAN II	BDL	0.01
ENDOSULFAN SULFATE	BDL	0.01
ENDRIN	BDL	0.01
ENDRIN ALDEHYDE	BDL	0.01
HEPTACHLOR	BDL	0.005
HEPTACHLOR EPOXIDE	BDL	0.005
TOXAPHENE	BDL	10
ENDRIN KETONE	BDL	0.01
METHOXYCHLOR	BDL	0.05

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: 40 CFR PART 136, FRIDAY, OCTOBER 26, 1984
METHOD 608

^{*} Pesticide identification is tentative. GC confirmation is needed for positive identification.

10,430-21 2332-356 FT Wipe Sam. Blk 8/07/87 Solid

PESTICIDES	REP 1 REP 2 CONCENTRATION (ug/wipe)	DETECTION LIMIT (ug/wipe)
ALDRIN	BDL BDL	0.005
ALPHA-BHC	BDL BDL	0.005
BETA-BHC	BDL BDL	0.005
GAMMA-BHC	BDL BDL	0.005
DELTA-BHC	BDL BDL	0.005
CHLORDANE	BDL BDL	0.05
4,4'-DDT	BDL BDL	0.01
4,4'-DDE	BDL BDL	0.01
4,4'-DDD	BDL BDL	0.01
DIELDRIN	BDL BDL	0.01
ENDOSULFAN I	BDL BDL	0.005
ENDOSULFAN II	BDL BDL	0.01
Endosulfan Sulfate	BDL BDL	0.01
ENDRIN	BDL BDL	0.01
ENDRIN ALDEHYDE	BDL BDL	0.01
HEPTACHLOR /%	BDL BDL	0.005
HEPTACHLOR EPOXIDE	BDL BDL	0.005
TOXAPHENE	BDL BDL	10
ENDRIN KETONE	BDL BDL	0.01
METHOXYCHLOR	BDL BDL	0.05

BDL = BELOW DETECTION LIMIT METHOD REFERENCE: 40 CFR PART 136, FRIDAY, OCTOBER 26, 1984 METHOD 608

C3823 8/03/87 Water

Laboratory Control Sample

Matrix:

VOLATILE ORGANICS CONC. DETECTION TRUE **VALUE** FOUND LIMIT RECOVERY (ug/L) (ug/L) (ug/L) **CHLOROMETHANE** BDL BDL 10 VINYL CHLORIDE BDL BDL 10 CHLOROETHANE BDL. BDL 5 BROMOMETHANE BDL BDL 98.0 METHYLENE CHLORIDE 65.9 67 1.1-DICHLOROETHYLENE 5 BDL BDL BDL 1.1-DICHLOROETHANE BDL 1.2-trans-DICHLOROETHYLENE BDL BDL 5 60.4 39.3 5 CHLOROFORM 65 1,2-DICHLOROETHANE 90.2 85.0 5 94 1,1,1-TRICHLOROETHANE 73.8 25.4 34 92.7 5 CARBON TETRACHLORIDE 22.8 24 BROMODICHLOROMETHANE 84.5 77.7 5 92 5 1.2-DICHLOROPROPANE BDL BDL 1,3-trans-DICHLOROPROPENE BDL BDL TRICHLOROETHYLENE 55.1 22.3 5 40 BENZENE 5 BDL BDL 1,3-cis-DICHLOROPROPENE BDL 5 BDL 1.1.2-TRICHLOROETHANE BDL 5 BDL 2-CHLOROETHYL VINYL ETHER BDL - BDL DIBROMOCHLOROMETHANE 71.7 89.0 124 BROMOFORM 97.8 122 5 125 TETRACHLOROETHYLENE 48.0 5 19.0 39 1,1,2,2-TETRACHLOROETHANE BDL 5 BDL TOLUENE BDL BDL CHLOROBENZENE 79.1 55.6 5 70 **ETHYLBENZENE** BDL BDL ACETONE BDL BDL CARBON DISULFIDE BDL BDL 5 THF BDL BDL -25 MEK BDL BDL 25 VINYL ACETATE BDL BDL 10 MIBK BDL BDL 25 2-HEXANONE BDL BDL 25 STYRENE BDL BDL .. 5 XYLENES BDL BDL 5

SURROGATE STANDARDS RECOVERY

	RECOVERY	ACCEPTANCE LIMITS
	(%)	(%)
d4-dichloroethane	100	76 - 114
d8-toluene	106	88 - 110
Bromofluorobenzene	102	86 - 115

BDL = BELOW DETECTION LIMIT
METHOD REFERENCE: EPA SW 846, 2ND EDITION
METHOD 8240

Lab Number:

Sample Designation:

Calibration Verification C3849 -8/04/87 Water

Date Analyzed: Matrix:

VOLATILE ORGANICS	CONC. OF STANDARD	CONC. FOUND	* RECOVERY	DETECTION LIMIT
	(ug/L)	(ug/L)		(ug/L)
CHLOROMETHANE	50	24	48	10
VINYL CHLORIDE -	50	29	58	10
CHLOROETHANE	50	2 5	50	5
BROMOMETHANE	50	24	48	5 5
METHYLENE CHLORIDE	50	53	106	5
1,1-DICHLOROETHYLENE	· 50	50	100	. 5 5
1,1-DICHLOROETHANE	50	57	114	5
1,2-trans-DICHLOROETHYLENE	50	. 46	92	
CHLOROFORM	50	42	84	5
1,2-DICHLOROETHANE	50	40	80	5
1,1,1-TRICHLOROETHANE	50	34	68	5 5 5 5
CARBON TETRACHLORIDE	50	32	- 64	5.
BROMODICHLOROMETHANE	50	42	84	5
1,2-DICHLOROPROPANE	50	54	108	5
1,3-trans-DICHLOROPROPENE	38	40	105	5
TRICHLOROETHYLENE	50	37	74	* 5
BENZENE	50	49 -	98	5
1,3-cis-DICHLOROPROPENE	62	53	85	5 5 5
1,1,2-TRICHLOROETHANE	50	56	112	5
2-CHLOROETHYL VINYL ETHER	50	31	62	5 5
DIBROMOCHLOROMETHANE	50	40	80	Š
BROMOFORM	50	45	90	5 5
TETRACHLOROETHYLENE	50	.34	68	5
1,1,2,2-TETRACHLOROETHANE	50	57	114	5 5 5
TOLUENE	50	52	104	Š
CHLOROBENZENE	50	42	84	5
ETHYLBENZENE	50	46	92	5
	•	Ģ.		<u> </u>
ACETONE	50	43	86	25
CARBON DISULFIDE	50	33	66	5
THF	50	76	152	25
MER	50	72.	144	25
VINYL ACETATE	50	58	116	10
MIBK	50	72	144	25
2-HEXANONE	50	71	142	25
STYRENE	50	46	92	5
XYLENES	134	130	97	5
· · · · · · · · · · · · · · · · · · ·		. 200		-

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: BPA SW 846, 2ND EDITION

METHOD 8240

Lab Number:

Sample Designation: Date Analyzed: Matrix:

Blank

8/04/87 Water

VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
	(ug/L)	(ug/L)
CHLOROMETHANE	BDL	10
VINYL CHLORIDE >	BDL	10
CHLOROETHANE	BDL	5
BROMOMETHANE	BDL	. 5
METHYLENE CHLORIDE	13	5
1,1-DICHLOROETHYLENE	BDL	5
1,1-DICHLOROETHANE	BDL	5
1,2-trans-DICHLOROETHYLENE	BDL	5
CHLOROFORM	BDL	5
CHLOROFORM 1,2-DICHLOROETHANE	BDL	5
1,1,1-TRICHLOROETHANE	BDL	. 5
CARBON TETRACHLORIDE	BDL	5
BROMODICHLOROMETHANE	BDL	5
1,2-DICHLOROPROPANE	BDL	5 '
1.3-trans-DICHLOROPROPENE	BDL	5
TRICHLOROETHYLENE BENZENE	BDL	5 5 5 5 5
BENZENE	BDL	5
1,3-cis-dichloropropene 1,1,2-trichloroethane	BDL	, <u>,</u> ,
1,1,2-TRICHLOROETHANE	BDL	Š
2-CHLOROETHYL VINYL ETHER	BDL	5
DIBROMOCHLOROMETHANE	BDL	5
BROMOFORM	BDL	5
TETRACHLOROETHYLENE	BDL	5
1,1,2,2-TETRACHLOROETHANE	BDL	· 5
TOLUENE	BDL	5
CHLOROBENZENE	BDL	5
ETHYLBENZENE	BDL .	5
	202	5
ACETONE	BDL	. 25
CARBON DISULFIDE	BDL	5
THE	BDL	25
MEK	BDL	25 25
VINYL ACETATE	BDL	10
MIBK	BDL	
2-HEXANONE	BDL	25 25
STYRENE	BDL	25 5
XYLENES	BDL	5 5
	BUL	, , , , , , , , , , , , , , , , , , ,

SURROGATE STANDARDS RECOVERY

	RECOVERY	ACCEPTANCE LIMITS
d4-dichloroethane	90	76 - 114
d8-Toluene	101	88 - 110
Bromofluorobenzene	87	86 - 115

BDL = BELOW DETECTION LIMIT METHOD REFERENCE:

BPA SW 846, 2ND EDITION METHOD 8240

Lab Number: Blank 100 ME Sample Designation: C3847 Date Analyzed: 8/04/87

Matrix:

VOLATILE ORGANICS	CONCENTRATION	DETECTION LIMIT
•	(ug/g)	(ug/g)
CHLOROMETHANE	BDL	1
VINYL CHLORIDE	BDL	1
CHLOROETHANE	BDL	0.5
BROMOMETHANE -	BDL	1
METHYLENE CHLORIDE	1.7	0.5
1,1-DICHLOROETHYLENE	BDL	0.5
1,1-DICHLOROETHYLENE 1,1-DICHLOROETHANE	BDL	0.5
1,2-trans-DICHLOROETHYLENE	BDL	0.5
CHLOROFORM	BDL	0.5
1,2-DICHLOROETHANE	BDL	0.5
1,1,1-TRICHLOROETHANE	BDL	0.5
CARBON TETRACHLORIDE	BDL	0.5
BROMODICHLOROMETHANE	BDL	0.5
1,2-DICHLOROPROPANE	* BDL	0.5
1,3-trans-DICHLOROPROPENE	BDL	0.5
TRICHLOROETHYLENE	BDL	0.5
BENZENE	BDL	0.5
1,3-cis-DICHLOROPROPENE	BDL	0.5
1,1,2-TRICHLOROETHANE	BDL	0.5
2-CHLOROETHYL VINYL ETHER	BDL	0.5
DIBROMOCHLOROMETHANE	BDL	0.5
BROMOFORM	BDL	0.5
TETRACHLOROETHYLENE	BDL	0.5
1,1,2,2-TETRACHLOROETHANE	BDL	0.5
TOLUENE	.7	0.5
CHLOROBENZENE	BDL	0.5
ETHYLBENZENE	BDL	0.5
ACETONE	BDL	2.5
CARBON DISULFIDE	BDL	0.5
THF	BDL	2.5
MEK	BDL	2.5
VINYL ACETATE	BDL	1
MIBR	BDL	2.5
2-HEXANONE	BDL	2.5
		

Solid

SURROGATE STANDARDS RECOVERY

STYRENE

XYLENES

	RECOVERY	ACCEPTANCE LIMITS
d4-dichloroethane	84	70 - 121
d8-toluene	92	81 - 117
Bromofluorobenzene	81	74 - 121

BDL

BDL

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: EPA SW 846, 2ND EDITION

MATRIX SPIKE DUPLICATE RECOVERY

Laboratory Number: 10,430-10
Sample Designation: 2332-344 FT Sediment #4
Date Analyzed: 8/04/87

Date Analyzed: Matrix:

- -	4	ug/L SPIKE	REPLICATE 1		REPLICATE 2		RELATIV.
COMPOUND	ug/L IN Sample		ug/L Found	*REC- OVERY	ug/L Found	* REC- OVERY	RANGE
1,1-DICHLOROETHENE	0	50	70	140	77	154	10
TRICHLOROETHYLENE	0	52	78	150	· 89	171	13
BENZENE	0	48	60	125	69	144	14
Toluene	9	48	63	113	72	131	13
CHLOROBENZENE	0	53	70	132	81	153	15

METHOD REFERENCE:

EPA SW 846, 2ND EDITION

METHOD 8240

TABLE F.1 - FIELD DUPLICATE ANALYSIS

AQUEOUS SAMPLES		MV-2 2332-302 ug/L	MM-2 Field Duplicate 2332-306 ug/L	Relative Difference (%)	QAPP Objective (%)
Volatile Organics	·	ND	WD	••	<30
Extractable Organics		•			\$ € *\$
Bis(2-ethylhexyl)phthal	lete	120,000	98,000	20	<30
Total Metals					
Silver	es: Ag	<10	<10	0 .	<30
Arsenic	as As	16	18	12	<30
Barium	es Be	230	190	19	<30
Cadnium	es Cd	<5	<5	0	<30
Chronium	as Cr	97	71	31	<30
Mercury	as Ng	<.5	<.5	. 0	<30
Lead	as Pb	<30	16	61	<30
Selenium	es Se	<10	<10	0	<30
SOIL SAMPLES		8-3	9-3 Field Duplicate	Relative	QAPP
		2332-322	2332-328	Difference	Objective
	*,	ug/kg	ug/kg	(%)	(%)
Volatile Organics		ND:	iiD	••	<30
Extractable Organics		:			
Bis(2-ethylhexyl)phthala	ete	1,500	1,100	30	<30

Laboratory Number: B-M107
Sample Designation: Blank
Date Analyzed: 8/10/87
Matrix: Solid

PESTICIDES	CONCENTRATION (ug/wipe)	DETECTION LIMIT (ug/wipe)
ALDRIN	BDL	0.005
ALPHA-BHC	BDL	0.005
BETA-BHC	BDL	0.005
GAMMA-BHC	BDL	0.005
DELTA-BHC	BDL	0.005
CHLORDANE	BDL	0.05
4,4'-DDT	BDL	0.01
4,4'-DDE	BDL	0.01
4,4'-DDD	BDL	0.01
DIELDRIN	BDL	0.01
ENDOSULFAN I	BDL	0.005
ENDOSULFAN II	. BDL	0.01
ENDOSULFAN SULFATE	BDL	0.01
ENDRIN	BDL	0.01
ENDRIN ALDEHYDE	BDL	0.01
HEPTACHLOR	BDL	0.005
HEPTACHLOR EPOXIDE	BDL	0.005
TOXAPHENE	BDL	10
ENDRIN KETONE	BDL	0.01
METHOXYCHLOR	BDL	0.05

BDL = BELOW DETECTION LIMIT

METHOD REFERENCE: 40 CFR PART 136, FRIDAY, OCTOBER 26, 1984 METHOD 608

^{*} Pesticide identification is tentative. GC confirmation is needed for positive identification.

MATRIX SPIKE DUPLICATE RECOVERY

Laboratory Number: 10,430-12
Sample Designation: 2332-346 FT Sed Sam Blk
Date Analyzed: 8/04/87

Date Analyzed: Matrix:

Water

				REPLIC	ATE 1	REPLIC	ATE 2	RELATIV
	COMPOUND	ug/L IN Sample	ug/L SPIKE	ug/L Found	*REC- Overy	ug/L Found	* REC- OVERY	RANGE
ſ	1,1-DICHLOROETHENE	0	50	79	158	82	164	A
•	TRICHLOROETHYLENE	0	52	89	171	87	167	2
	BENZENE	0	48	67	140	66	138	. 2
	TOLUENE	0	48	69	144	67	140	3
	Chlorobenzene	Ò	53	79	149	77	145	. 3

METHOD REFERENCE:

EPA SW 846, 2ND EDITION

METHOD 8240

SEDIMENT SAMPLES

Sed-1 Sample 2332-341

			Sample 2332-34	1	
	Original Concentration ug/kg*	Spike Level ug/kg*	Total Concentration Found ug/kg*	% Recovery	QAPP Objective (X)
Petroleum Nydrocartions	220,000	320,000	710,000	156	70-130
			Sed-1 Field Duplicate Sample 2332-346		
	Original Concentration ug/kg*	Spike Level ug/kg*	Total Concentration Found ug/kg*	X Recovery	QAPP Objective (%)
Petroleum Hydrocarbons	280,000	630,000	660,000		70-130
			Sed-3 Sample 2332-343		
Total Metals	Original Concentration ug/kg ^a	Spike Level ug/kg*	Total Concentration Found ug/kg*	X Recovery	QAPP Objective (%)

150

990

1,180

70-130

[%] Recovery = amount found-amount in sample x 100 amount spiked

^{*} dry wt. besis

TABLE F.2-LABORATORY SAMPLE SPIKES continued

 -	-			
ÆŒ		-	-	

M/- 1	
Sample	2332-301

Total Metals		Original Concentration ug/L	Spike Level ug/L	Total Concentration Found ug/L	X Recovery	QAPP Objective (%)
Silver Arsenic Barium Cadmium Chromium Hercury Lead Selenium	as Ag as As as Ba as Cd as Cr as Hg as Pb as Se	<10 <10 200 <5 31 <0.5 <100 <10	50 50 5,000 500 5,000 10 5,000 50	53 42.7 4,940 477 5,400 7.6 4,970	106 85 95 94 107 76 99	70-130 70-130 70-130 70-130 70-130 70-130 70-130 70-130

SOIL SAMPLES

S-1 Sample 2332-320

Total Metals		Original Concentration ug/kg*	Spike Level ug/kg*	Total Concentration Found ug/kg*	X Recovery	QAPP Objective (%)
Silver	es Ag	<1,000	7,200	7,000	97	70-130
Arsenic	es As	<19,000	7,200	22,500	49	70-130
Barium	es Be	94,000	724,000	757,000	91	70-130
Cadmium	es Cd	720	72,000	71,000	98	70-130
Chromium	es Cr	39,000	725,000	796,000	104	70-130
Lead	es Pb	40,000	724,000	684,000	89	70-130
Selenium	es Se	<1,000	7,200	4,100	57	70-130

S-7 Sample 2332-326

Total Metals		Original Concentration ug/kg*	Spike Level ug/kg*	Total Concentration Found ug/kg*	X Recovery	QAPP Objective (%)
Silver" "	. es Ag	<1,000	6,000	5,800	97	70-130
Arsenic	es As	20,000	6,000	22,800	47	70-130
Berlim	es Se	5,000	602,000	617,000	102	70-130
Cadaius	es Cd	<600	60,200	55,000	90	70-130
Chronium	es Cr	27,000	602,000	640,000	102	70-130
Lead	as Pb	45,000	602,000	578.000	89	70-130
Selenium	as Se	<1,000	6,000	2,600	43	70-130

TABLE F.2 - LABORATORY SAMPLE SPIKES

SOIL SAMPLE

S-1 Sample 2332-320

			Replicate 1		Replicate 2			
Compound	ug/kg ^e In Sample	ug/kg* Spike	ug/kg* Found	X Recovery	ug/kg* Found	X Recovery	Relative X Difference	QAPP Objective
	•		-				*	(X)
1,1 Dichloroethene	O	7,000	8,000	122	8,000	112	9	<30
Trichlorethylene	0	8,000	10,000	119	10,000	115	3	<30
Senzene	0	7,000	8,000	122	8,000	115	5	<30
Toluene	0	7,000	8,000	121	8,000	124	2	<30
Chlorobenzene	0	7,000	9.000	131	9,000	124	\$	<30 ·

*dry wt besis

Relative Percent Difference = Range X 100

AQUEOUS SAMPLE

IN-1 temle 2882-1

Sample 2332-301

			Replicate 1		Replicate 2			
	ug/L	ug/L	ug/L	X	Ug/L	X :	Relative	QAPP
Compound	In Sample	Spike	Found	Recovery.	Found	Recovery	% Difference	Objective
4 4 94 4 5	_							(X)
1,1 Dichloroethene	0	54	68	126	55	102	21	<30
Trichlorethylene	0	67	67	100	59	88	13	<30
Benzene	0	52	58	112	53	102	9	<30
Toluene	• 0	54	54	100	48	89	12	<30
Chlorobenzene	0 .	58	61	105	56	97	•	< 3 0

TABLE F.1 - FIELD DUPLICATE ANALYSIS continued

SOIL SAMPLES		

SOLE SAMPLES					
	:	\$-3	\$-3		
			Field Duplicate	Relative	QAPP
		2332-322	2332-328	Difference	Objective
			·	(%)	(X)·
Total Metals		ug/kg*	ug/kg*	* .	
Silver	es Ag	1,100	<2,000	58	<30
Arsenic	es As	15,000	16,000	6	<30
Serium	es Bo	76,000	100,000	27	<30
Cadnium	es Cd	530	<800	41	<30
Chromium	es Cr	32,000	42,000	27	<30
Hercury	es Mg	420	450	7	<30
Lead	es Pb	80,000	90,000	12	<30
Selenium	as Se	<1,000	<1,000	0	<30
					£.
		Sed-3	Sed-3		
SEDIMENT SAMPLES			Field Duplicate	Relative	QAPP
		2332-341	2332-344	Difference	- Objective
		ug/kg	ug/kg	(%)	(%)
Volatile Organics		ND	ND	••	<30
Total Metals		:			
Silver		<1,000	<2,900	67	<30
Arsenic		4,900	4,600	6	<30
Berium		<10,000	27,000	92	<30
Cadalum		<500	<600	18	<30
Chronium'	•	13,000	14,000	7	<30
Hercury		270	280	4	<30
Lead		210,000	190,000	15	<30
Selenium		<1,000	<1,000	0	<30

NO = Not Detected, all volatile organics compounds were below detection limits $^{\circ}$ dry wt basis

Relative % difference = Range X 100

Hear

TABLE F.3 - LABORATORY REPLICATES

AQUEOUS SAMPLES

MW-1 Sample 2332-301

<i>,</i>						Relative	QAPP
Total Metals			Replicate 1 ug/L	Replicate 2 ug/L	Mean ug/L	Difference (X)	Objectives (%)
Silver	88	Ag	<10	<10	<10	0	<30
Arsenic	88	As	<10	<10	<10	Ŏ	<30
Berium	88	Be	100	200	200	50	<30
Cadnium	88	Cd:	<5	45	<5	0	<30
Chronium	88	Cr	32	29	31	9.7	<30
Mercury	88	Ng	<0.5	≪0,5	<0.5	0	<30
Lead	85	Pb	<100	<100	<100	Ŏ	<30.
Selenium	88	Se	<10	<10	<10	Ŏ	<30

SOIL SAMPLES

S-1 Sample 2332-320

Total Metals	•	Replicate 1 ug/kg ^e	Replicate 2 ug/kg*	Heen ug/kg*	Relative Difference (X)	GAPP Objectives (X)
Silver	es Ag	<1,000	<1,000	<1,000	0	<30
Arsenic	es As	20,000	18,000	19,000	10.5	<30
Barius .	· es Be	93,000	95,000	94,000	2	<30
Codmium	es Cd	690	740	720	6.9	<30
Chronium	es Cr	38,000	39,000	39,000	3	<30
Lead	es Pb	40,000	40,000	40,000	Ŏ	<30
Setenium	as Se	<1,000	<1,000	<1,000	Ō	<30

S-7 Sample 2332-326

Total Metals			Replicate: 1 ug/kg*	Replicate 2 ug/kg*	Hean ug/kg*	Relative Difference (%)	QAPP Objectives (%)
Silver	ės	Age	<1,000	<1,000	<1,000	0	<30 ·
Arsenic	. 88	As	21,000	19,000	20,000	10	<30
Berium	es	80	58,000	56,000	57,000	3.5	<30
Cadalum	85	Cd	<600	<600	<600	0	<30
Chromium	88	Cr	26,000	27,000	27,000	3.7	<30
Lead	85	Pb	47,000	43,000	45,000	8.9	<30
Setenium	88	Se	<1,000	<1,000	<1,000	0	<30

\$-8 Sample 2332-328

Total Metals		Replicate 1 ug/kg*	Replicate 2 ug/kg*	Meen ug/kg*	Relative Difference (X)	QAPP Objectives (%)
Hercury	es Hg	209	204	207	2.4	<30

SEDIMENT SAMPLES

Sed-3 Sample 2332-343

Total Metals		Replicate 1	Replicate 2 ug/kg*	Mean ug/kg*	Relative Difference (%)	QAPP Objectives (%)	
Hercury	es Hg.	140	160	150	13	<30	
Petroleum Hydrocarbo	ns .	190,000	150,000	170,000	24	<30	

^{*} Dry wt. basis

TABLE F.4 - SURROGATE STANDARD RECOVERIES--Volatile Compounds

		D(4)-1-2-0	ichloroethene	. D8-To	tuene	Bromof Luorobenzene		
Sample Description	Sample No.	% Recovery	Control Range	X Recovery	Control Range		Control Range	
NV-1	2332-301	. 88	76-114	79	88-110	87	86-115	
9N-2	2332-302	90	76-114	81	88-110 4		86-115 #	
MW-2 Field Duplicate	2332-306	88	76-114	81	88-110 4		86-115 *	
MV-3	2332-303	106	76-114	81	S 88-110 s		86-115 *	
1NJ-4	2332-304	105	76-114	81	88-110		86-115 *	
MV-5	2332-305 Lab Rep 1	96	70-121	81	81-117	85	74-121	
mi-5	2332-305 Lab Rep 2	90	70-121	77	81-117 *		74-121	
Well Sample Blk	2332-308	100	76-114	79	88-110 *		86-115 *	
Well Travel Blk	2332-360	94	76-114	79	88-110 *	87	86-115	
Leb Control	D0027	83	76-114	77	88-110 +		86-115 •	
Leb Control	00012	96	76-114	79	88-110 *	83	86-115 *	
S-1	2332-320	90	70-121	111	81-117	102	74-121	
· 8-2	2332-321	90	70-121	101	81-117	101	74-121	
8-3	2332-322	66	70-121	90	81-117	76	74-121	
S-3 Field Duplicate	2332-326	92	70-121	105	81-117	103	74-121	
8-4	2332-323	100	70-121	105	81-117	103	74-121	
s-5	2332-324	96	70-121	107	81-117	105	74-121	
3-6	2332-325	90	70-121	101	81-117	100	74-121	
8-7	2332-326	88	70-121	100	81-117	100	74-121	
8-8	2332-327	88	70-121	94	81-117	101	74-121	
Soil Sample Blk .	2332-333	. 84	76-114	100	88-110	93	86-115	
Soil Travel Blk :	2332-335	: 86	76-114	100	88-110	94	86-115	
Sed-1	2332-341	87	70-121	89	81-117	81	74-121	
Sed-1 Field Duplicate	2332-344	98	70-121	90	81-117	78	74-121	
Sed-2	2332-342	84	70-121	84	81-117	83	74-121	
Sed-3	2332-343	86	70-121	90	81-117	80	74-121	
Sed Sample Bik	2332-346	90	76-114	100	88-110	83	86-115	
Sed Travel Bik	2332-348 Leb Rep 1	92	70-121	96	81-117	85	74-121	
Sed Travel Bik	2332-348 Leb Rep 2	92	70-121	94	81-117	83	74-121	
Lab Control	C3823	100	76-114	106	88-110	102	86-115	

[%] Recovery = Amount found % 100, It is assumed that analyte in sample is negligible Amount in spike

^{* %} Recovery outside Control Range

TABLE F.5 - SURROGATE STANDARD RECOVERIES--Extractable Organics

•		2-71-7	henel	di-Ph	enet	Witrob	Intene	2-F1-01	shawi	tribrono	A1		
Saspin Description	Surple No.	1 Recovery	Control Range	# Recovery	Control Range	% Recovery	Control Range	% Recovery	Control Range	% Recovery	Control Range	Terphen T Recovery	yt-014 Control Range
:00-1	2332-301	53	21-100	-35	10-94	90							
104-1	2332-301-Lab Rus	39	21-100	29	10-94		35-114	70	43-116	31	10-123	80	33-141
M-2	2332-302	43	21-100	42		97	35-114	71	43-116	30	10-123	78	33-141
MV-2 Field Suplicate	2332-306			-	10-94	91	35-114	76	43-116	48	10-123	72	33-141
M-5 LIGHT ONDLICES		60	21-100	39	10-94	107	35-114	86	43-116	50	10-123	100	33-141
	5335-303	32	21-100	24	10-94	103	35-114	81	43-116	38	10-123	105	33-141
MI-4	2332-304	62	21-100	42	10-94	100	35-114	84	43-116	38	10-123	66	33-141
IN-5	2332-305	43	21-100	41	10-94	96	35-114	82	43-116	45	10-123	97	
Well Sample Bik	2332-308	44	21-100	. 39	10-94	85	35-114	69	43-116	47	10-123	101	33-141
8-1	2332-320	12	21-100	13	10-94	16	35-114 •	26	43-116 •	33	10-123		33-141
8-2	2332-321	16	Z1-100	15	10-94	19	35-114 •	27	43-116 •	29		41	33-141
8-3	2332-322	21	21-100	30	10-94	17	35-114 *	20 .	43-116 •		10-123	45	33-141
, 8-3 Field Duplicate	2332-328	. 12.	21-100 *	21	10-94		35-114 •	17	43-116	30	10-123	73	33-141
8-4	2332-323	34	21-100	46	10-94	. 43	35-114			16	10-123	. 54	33-141
1-5	2332-324	17	21-100 •	ສ	10-94	49		52	43-116	- 59	10-123	80	33-141
1-4	2332-325	. 35	21-100	43	10-94		33-114	43	43-116	51	10-123	67	33-141
8-7	2332-326	27		-		.41 :	35-114	58	43-116	70	10-123	.64	33-141
8-8	2332-327	47	21-100	35	10-94	23	35-114 •	28	43-116 •	33	10-123	67	33-141
:		•	21-100 0	20	10-94	1	23-120 *	14	30-115 •	24	10-123	12	18-137 •
S-S Lab Supilicate	2332-327	"	21-100 •	26	10-94	5 .	23-120 •	14	30-115 •	16	10-123	18:	18-137
Soil Sample Bik	5235-333	#	21-100	42	10-94	100	35-114	84	43-116	51	10-123	- 96	33-141
Blank	D:A014	15	21-100 *	24	10-94	•	35-114 •	21	43-116 *	24	10-123	41	33-141
Blank	0-A105	37	21-100	24	10-94	100	35-114	79	43:116	50	10-123	91	33-141 ⁻

ξ,

^{* %} Recovery outside Control Range

APPENDIX F NEW JERSEY SOIL CLEANUP APPROACHES

Attachment 6

Cleanup Approaches used by MJDEP

New Jersey Department of Environmental Protection Summary of Approaches to Soil Cleanup Levels

(I) Discussion of Theoretical Approaches

MJDEP has investigated many theoretical approaches to establishing cleanup objectives for contaminated soil including cleanup to background, cleanup to the analytical detection limits and cleanup to a risk asses ment derived number.

- (A) Cleanup to Background has been considered for a number of compounds.

 Development of a cleanup objective based on background requires an extensive environmental data base. This approach can only be applied to compounds which are normally found in nature. If it is applied to anthropogenic compounds the cleanup level could become "sero" which equates to the current limit of detection of the analytical method in use. A cleanup objective based on background is determined by the range of concentrations observed on a specific site or based on literature values. This approach has been applied to inorganic compounds. For petroleum hydrocarbons, an "industrial" background is generalised as 100 ppm.
- Cleanup levels based on analytical detection limits have been considered. In reality, the cleanup objective becomes the limit of detection of the analytical method, thus the cleanup objective becomes non-detectable (cleanup to pristine conditions). This approach is undesirable by itself because the limit of detection of analytical methods is a moving target. Current trends in environmental analytical chemistry indicate that detection limits will continue to decrease to levels that are below those of environmental or public health concern. This approach is further complicated by the fact that in many instances the method detection limit is influenced by the mature of the matrix and the presence of other interfering compounds.

Developing a cleanup objective based on method detection limits can only be applied to anthropogenic compounds. If applied to compounds which occur naturally, the cleanup objective could be well below the levels normally found in the environment.

(C) Risk assessment methodology has been used to establish cleanup objectives. The use of risk assessment is common to standard and/or criteria setting. The Water Preliminary Protective Concentration Limits and Recommended Maximum Conteminant Levels are based on risk assessment methodologies which estimate the risks from carcinogens and moncarcinogens in drinking water. In the case of carcinogens, it is assumed that no threshold exists below which cancer does not develop. Thus, exposure to any dose regardless of how small, results in a cancer risk. For noncarcinogens, on the other hand, a threshold exists below which no response is observed. Thus a "safe" dose exists. The numbers developed for risk based standards/criteria range

from sub parts per billions (carcinogens) to hundreds of parts per million (non-carcinogens).

It must be noted that the use of the risk assessment approach requires that an exposure pathway be defined in terms of the frequency and duration of exposure and that a suitable toxicology database exists for the chemical of concern. In the absence of either of these, the risk assessment approach cannot be applied correctly. Where there is uncertainty regarding the route or extent of exposure, the risk assessment will reflect these uncertainties.

In general, conservati e worst case exposure scenarios are used in developing risk based standards or criteria. Unfortunately, real life exposures may be quite different than those used to develop the risk based number. Thus a risk based number may "overprotect" the individuals being exposed. This can be avoided by developing situation specific risk based cleanup criteria or by developing a range of exposure scenarios which can be selectively applied to specific situations. The most conservative approach (and the least time consuming) is to use reasonable worst case exposure scenarios to protect the most sensitive individual likely to be exposed.

- (D) Chemical class cleanup objectives have been set for classes of compounds. Cleanup objectives which have been established for a class of compounds are used as a surrogate or action level to indicate if a closer look at the individual chemicals comprising the residue is warranted.
- (II) Application of Cleanup Approaches in WJDEP Programs.

Soil cleanup levels have been developed based on anticipated background or risk assessment. In general, the Department attempts to establish a soil cleanup level that:

- protects human bealth from direct contact
- protects groundwater from degradation due to leaching
- protects surface water (in situations when migration of contaminated soil to surface water is a possibility).

The Department has also established surrogate or alarm levels for classes of compounds. These surrogates are usually conservatively set to serve as an indicator or "red flag" to point the need for further attention. This approach allows staff not trained in toxicology to determine when the assistance of a toxicologist/environmental chemist is needed. In general, surrogate levels are not cleanup numbers, but they could be in certain situations.

(A) Inorganic compounds - Cleanup levels for metals have been established based on expected background concentrations in New Jersey soils. The cleanup objectives are generally to 1 to 3 times background depending on the range of concentration observed and toxicity. Table 1 summarizes New Jersey background, United States background and soil cleanup objectives. Some of the cleanup objectives were proposed by

BCRA applicants and have been accepted by the Department in BCRA cleanups. The cleanup objectives applied at a specific site may be different than those listed in Table 1 depending on site specific factors. These exceptions normally allow higher levels to remain on site. These situations include (1) if information exists to indicate the soil background ensite is different than values listed in the Table, (2) contamination from other sources is suspected (especially lead on a site near highways), (3) a contamination problem is area wide and (4) encapsulation is included as part of the cleanup plan.

(B) Organic contaminants - Cleanup levels for individual organic compounds have been developed based on Tak assessment methodologies. A worst case soil ingestion model is used to calculate an acceptable soil contaminant level (ASCL) to protect individuals from direct contact and a simple transport to groundwater model is used to calculate an ASCL to protect groundwater quality. The ASCLs are then compared to analytical method detection limits to determine if the calculated concentration can be measured accurately. If the risk based criterion is below the method detection limit, the method detection limit becomes the cleanup objective.

This latter approach has been used by the New Jersey Division of Mazardous Site Mitigation (PHSM) to develop an acceptable soil contaminant level for PCBs based on direct contact. (Transport to groundwater was considered insignificant since PCBs bind strongly to soils.) A risk assessment utilizing a pica and inhalation of soil scenario indicated that individuals could be exposed to soils contaminated with 274 ppb of PCBs without exceeding a one-in-a-million lifetime cancer risk due to this exposure. The limit of detection of PCBs in soil using current analytical methods is 3.3 ppm. In reality 5 ppm or above can be detected with confidence. Thus the acceptable soil contaminant level (based on analytical methods) is 5 ppm. In situations where the potential for children to come in contact with soils is great (ie., parks, schoolyards, residential areas) 5 ppm is not adequate to protect health and a cleanup objective of 1 ppm should be considered, in spite of the inherent uncertainty with regard to quantitation.

This risk approach has been embodied in a document entitled Calculation of Cleanup Levels for Contaminated Soils, recently prepared by DESM. The approach outlined in the document is composed of two steps (A) selection of chemicals of concern and (B) calculation of acceptable soil contaminant levels to protect individuals from direct contact and to protect groundwater and surface water quality. The approach has been used to rank and calculate acceptable soil contaminant levels for 21 compounds which include PCBs, chlorinated solvents, monchlorinated solvents, phenols, polycylicaromatic hydrocarbons, and phthalates. This approach was developed in-house and has not gone through an external poer review. DESM is finalizing a request for proposal to hire a consultant to review, critique and refine the approach developed by DESM.

(C) Surrogate oraction levels have been developed for volatile organics, base neutral extractables and petroleum hydrocarbons as shown below.

Volatile Organics 1 ppm
Base Neutrals 10 ppm
Petroleum Hydrocarbons 100 ppm

12

(D) Chemical Class Cleanup Objectives have been set for petroleum hydrocarbons at 100 ppm. (This was assumed to be "industrial background".) The actual soil cleanup number will vary depending on the chemical constituents present in the petroleum residue. Levels greater than 100 ppm may be acceptable if the residue is comprised mainly of toluene or xylenes while a level less than 100 ppm may be warranted if the residue is comprised mostly of bensene and/or the carcinogenic polynuclear aromatic hydrocarbons.

Metal	W.J. Background	U.S. Background	Cleasup Objective	Time above By Background
Arsenic Fraction Codnium	W.A. ALP, 1.0 - 4.0	1.1 - 16.7 10 - 16 00 (2430) 0.01 - 1.0ppe	20 ppe 400 3 ppe	N.A.
Chronium	5.0 - 48	1 - 1,500	100 ppn 5, 1415	2
Copper	0.5 - 53.6	2 - 200	170	\$
Cyanide	B.A.	0.09	12*	3.4.
Lead .	1.0 - 180	2 - 200	250 - 1000°	1-2
Mercury	Ź.A.	0.01 - 4.6	1	B.A.
Vickel	11.1 - 86.5	8 - 550	100	1
Selenium	0.01 - 4 ^b	0.01 - 5.0	4	1
Silver	· F.A.	0.01 - 5	5	7.
Ziec	4.5 - 168	10 - 3000	350	2

E36114v

Date from Stephen Toth or Harry Notto, Cook College, Butgers Dniversity.

b. Doile Committee Unit of Contraction Cook College, Butgers C. No. Agricultural coils in W.J.

Suggested by a consultant on an ECRA a